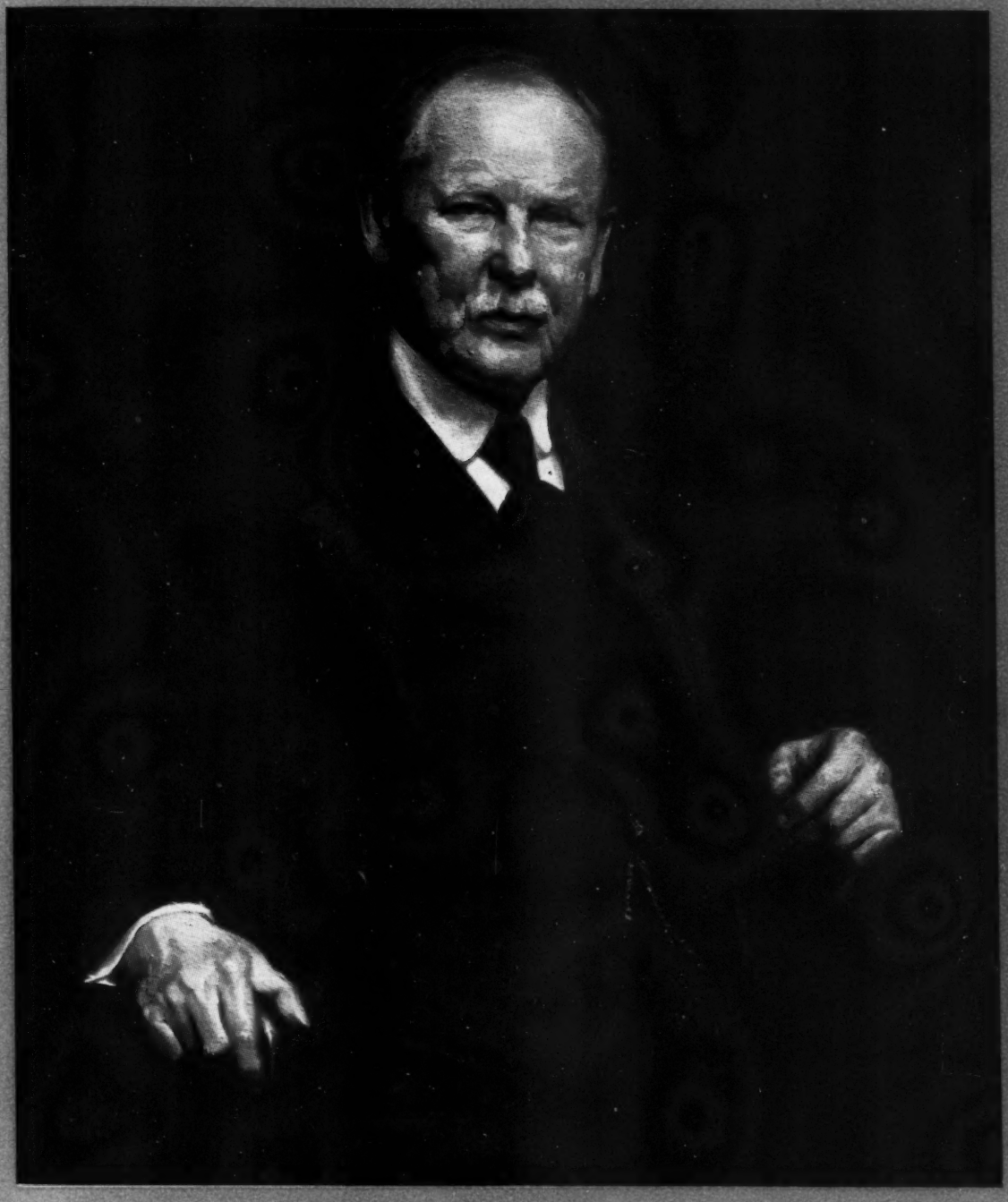
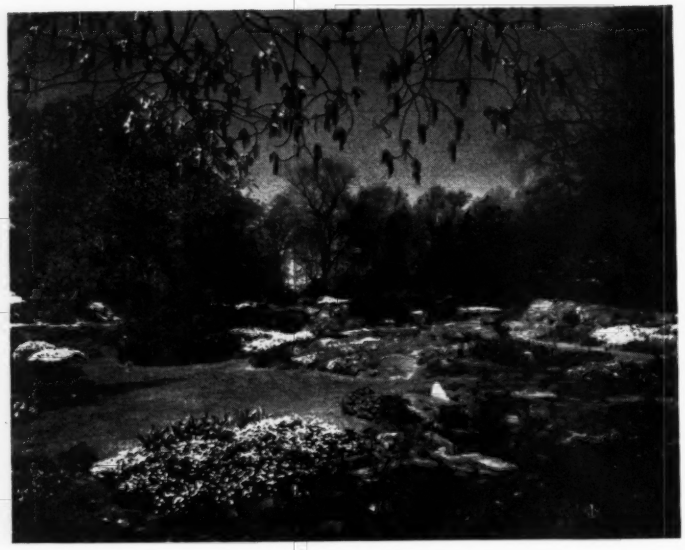


THE GARDEN JOURNAL

OF THE NEW YORK BOTANICAL GARDEN

Vol. 8, No. 4 July-August, 1958



Mark These Dates on Your Calendar

October 18, 1958 — Children's Flower Show and Annual Chrysanthemum Arranging Competition at the Garden

November 7, 1958 — First Day of Chrysanthemum Show in the Conservatory of The New York Botanical Garden

October 29, 1958 — Theater benefit, "Grand Hotel," starring Paul Muni with Joan Diener, sponsored by the Volunteer Associates of The New York Botanical Garden

January 8, 15, 22, 29, 1959 — Downtown Lecture Series sponsored by the Volunteer Associates of The New York Botanical Garden

February 4, 1959 — Annual Members' Day of The New York Botanical Garden

THE GARDEN JOURNAL

of The New York Botanical Garden

DOROTHY EBEL HANSELL
Editor

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AMONG OUR CONTRIBUTORS

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CREDIT FOR ILLUSTRATIONS

We are indebted to the Display Committee, Mrs. Charles Burlingham, Mrs. Richard S. Meredith, Mrs. Donald B. Straus, for the selection of the front cover illustration—photo by Underwood and Underwood of portrait of Dr. H. H. Rusby; pp. 116, 117, E. N. Mitchell; p. 118, J. J. Wurdack; p. 120, E. N. Mitchell; pp. 122, 123, 124, Arnold Arboretum; pp. 127, 128, 129, Walter Singer; pp. 130, 131, 132, 133, T. H. Everett; p. 136, G. B. Foster; p. 138—courtesy M. S. Gans; pp. 139, 140, Sidney Waxman; p. 145, Stanford University Press; p. 146—courtesy News Leaf, Garden Club of New Jersey.

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TACKLING THE LAWN PROBLEM
In The Middle Atlantic States

By **Fred V. Grau**

THE MIDDLE ATLANTIC STATES embrace New York, Pennsylvania, and New Jersey. For our purposes we are including southern Connecticut, Delaware and Maryland. Within this area there are many kinds of soils, ranging from pure sands to stiff clays. Climate, for the most part, is, shall we say charitably, variable. Rainfall, in most years, gives us forty to forty-two inches of water. If it is properly distributed, this is enough to grow wonderful grass and to keep it green all summer. Drought years like 1957 are exceptions, but they pose a serious problem. The worst problem is that, when water is needed for turf, quite often by edict it is not permitted to be used.

Elevation in the Middle Atlantic States ranges from sea level to half a mile high, enough to make a significant difference in practices. Many different kinds of trees grow in the area, some of which severely complicate the lawn situation. Drainage varies from excessive in the sands to very poor in some coastal plain red and yellow clays. Length of the growing season varies from almost two hundred and forty days in the southeastern part of the region to less than ninety days in the mountains. Temperatures change drastically, too. In places in Pennsylvania there may be frost in every month of the year. Frost in the nation's capital during the summer months would be unimaginable.

If we had to contend only with natural factors, it would not be so bad. But as we have to cope with the influence of Man, our problems are intensified. Some of the influences are the severe disturbance of the soil, the loss of topsoil, the creation of unnatural drainage conditions, and the construction of artificial barriers, such as houses and trees, which modify the climate.

Having established the fact that there are real problems in growing lawns in the Middle Atlantic States, we can proceed to a consideration about other things. Lawns have been considered as a part of agriculture only within the past decade. Today, they occupy so much land and use such a large part of the manufactured fertilizers that some county agricultural agents are appointed just to look after the yards and gardens of "Suburbia."

Lawns, after all, are crops. They are a specialized crop, not considered economic except that they account for the expenditure of billions of dollars in fertilizers, seed, lawn mowers, and other tools. A crop, generally speaking, is concerned with plants and soils and that is where we come into the picture. This crop we are talking about returns, not bushels of foodstuffs, but hours of enjoyment and relaxation. Values are measured in terms of appearance and satisfaction. A good lawn is an economic asset because it can improve property values appreciably and is an excellent soil and water conservation asset.

In a field of corn, quality is reflected in yield, that is, more bushels in the crib. In a lawn, quality is measured largely by eye, that is, how does it look? Quality is "freedom from weeds." I started research on weed control in lawns in 1927 at the University of Nebraska, when all we had to work with was iron sulfate, sodium arsenite and sodium chlorate. These were the chemicals. For fertilizers we had cottonseed meal, bonemeal and ammonium sulfate. We did not have any of the improved grasses. Today we have sturdier grasses that are able to throttle the weeds when given adequate encouragement from superior fertilizers, which have been available only during the past three years. What a change has taken place! During the time that the superior grasses and the superior fertilizers were being developed, superpowerful chemicals also were being tested and perfected. We have now a three-edged sword to cut away the age-old problems of the home owner—better grasses, safer, longer-lasting fertilizers, and safer, more effective chemicals. The lawn of today does not really need to have a weed problem.

Quality in lawns, to many, is color. Most folks say, "I want a lawn that is *green* the year round." No one has achieved this goal, nor has anyone proven to me that it is the most desirable approach to lawn quality. Bermuda grass and zoysia firmly are established in the warmer parts of the region, and they do not remain green the year round. Green color in the warm-season grasses must be achieved either through over-seeding with a cool-season grass or by spraying the grass with a green pigment. The three cool-season grasses that almost achieve year-round color include Merion bluegrass, Pennlawn creeping red fescue and Kentucky 31 fescue, when they are adequately fed with balanced high-nitrogen fertilizers. *Poa annua,* an ever-present invader of poor turf, is brilliant green during critical periods in fall and spring, but it is dull in the winter and disappears almost completely in the summer. This is a big advantage in properly maintained warm-season turf.

Quality in my book has to do more with uniformity. A smooth, even uniform carpet of turf is attractive even when it wears its coat of winter tan. A grass has just as much right to change its color for winter as do deciduous trees—I have not heard of anyone trying to dye the naked limbs of a maple tree green. Snowshoe rabbits change to a coat of white for the winter. They do not do it consciously, but the only rabbits that have survived in their area are those that do change to white for the winter. The other ones get caught and eaten. Bermuda and zoysia change to white, brown and tan; in this color they reflect the winter sun and perhaps enjoy some protection from the rigorous, changeable climate.

Quality also is firmness, with cushion or body. To me a good lawn turf is yielding to the foot, yet it is firm. It

should elicit the exclamation, "Ooooh! it's just like a carpet." A firm cushion is desirable, but the fluffy mat which frequently develops from unadapted bent grasses is something to be avoided.

Quality, especially where active, growing children are concerned, also means toughness and ability to take the wear and tear of everyday play. The grasses should be able to heal injuries rapidly, especially during the season of active use which, in our own case, is about eleven months out of the year.

Integrated into these concepts of quality lawn turf are the important considerations of resistance to extremes of heat and cold, to extremes of drought and excessive rainfall and humidity, resistance to disease and insects, and ability to grow in any kind of soil. We do not attach any particular concept of quality to the grass that will "grow two inches and stop" to reduce the need for mowing. It is regular mowing that helps give quality to turf. High, infrequent mowing produces a loose, open type of turf that does not rate a second look.

The grass that meets every quality factor has not yet been developed, but progress is being made. If you are impatient, just remember that it takes ten to fifteen years to put a new, improved grass on the market.

Often I am asked, "What is the first thing to do in starting a lawn improvement program?" This is the No. 1 question. My answer is a single word: FERTILIZE.

We might say, "Feed the fasting" or "Help the hungry" or "Succor the starving." It all means—fertilize. Adequate balanced nutrition is utterly basic to:

1. Weed Control. With proper fertilization the better grasses throttle into extinction nearly all lawn weeds.

2. Firm Cushion Effect. Roots grow deeper and better, add active organic matter and improve water infiltration.

3. Resistance to Drought. Well-fed grass requires much less water. Hungry grass requires five times as much water to produce the desired growth. So plan and plant—that if water is denied officially by decree or unofficially by Nature, the lawn will suffer only minor inconvenience.

4. Ability to Heal Injuries and Resist Wear and Tear. Adequate nitrogen fertilization stores protein in the rhizomes and underground parts. These give the plant vigor and ample reserves of food to meet emergencies.

5. Green Color. Only Urea-forms feed grass continuously and uniformly for the continuous green color that is so desirable.

In fertilizing we need to feed the bacteria first, the life in the soil. Bacteria are the unseen helpers that convert insoluble nitrogen forms to soluble or usable forms. If we feed the life in the soil, which always comes first, the grass will be taken care of more adequately than if we tried to feed the grass directly with soluble fertilizers.

In this table we try to compare fairly the qualities, characteristics, and limitations of the three major classes of fertilizers. We refer primarily to the nitrogen carriers, realizing that nitrogen alone is not a good grass fertilizer but must be balanced with other nutrient elements.

Inorganic nitrogen carriers have been the main reason for the starvation of lawn turf. When inorganics are applied in sufficient quantity to do some real good, they burn the grass. This has given rise to extreme caution in fertilizing turf. Natural organics have been much better and have enjoyed wide popularity because they do not burn, but there is rapid break-down in hot weather and no effect in cool weather. The odor sometimes is objectionable. The synthetic organics, or the Urea-forms, embody all of the most desirable features with none of the disadvantages. Now, for the first time, enough nitrogen fertilizer can be applied properly to feed the grass and the bacteria with no fear of burning, with perfect confidence that long-lasting, even, steady feeding will be achieved with no odor and a clean, sanitary atmosphere.

Dr. Kenneth G. Clark, Senior Chemist of the United States Department of Agriculture at Beltsville, Maryland, deserves great credit for his part in developing Urea-forms. It was he who insisted upon the designation of A. I., which means "Activity Index" and is a measure of quality of the Urea-forms. The Urea-forms contain a minimum of thirty-eight percent nitrogen with no phosphate and no potash. This gives an uncomplicated nitrogen fertilizer that can be combined with phosphate, potash, and other nutrient elements according to the need.

In 1953 Urea-form was compounded into a complete mixed fertilizer for the first time. The Urea-form used in this first mixed fertilizer came from the Nitroform Agricultural Chemical Company. The importance of balance with P and K was recognized and achieved from the start. Today there are three major manufacturers who produce solid Urea-forms for direct application. They are Nitroform, Du Pont and Borden. Significant work with Urea-forms has been accomplished at the University of Rhode Island, Pennsylvania State University, Purdue University, and other places. Some fifteen different manufacturers are making what are being known as "Blue Chip" fertilizers, which contain fifty to seventy-five percent of the nitrogen as Urea-form. Most of these are in a 2-1-1 ratio. A few are higher, notably the 20-6-4, which has been designed by the University of Rhode Island.

With old-fashioned, conventional fertilizers, much has been made of the time of fertilizing—there have been proponents for fall fertilizing and proponents for spring fertilizing. A new concept has arisen since Urea-form fertilizers have been made available to the public for use on lawns. When we have steady, uniform release of nitrogen throughout the entire season, it makes

Inorganic Nitrogen Fertilizers	Natural Organic Nitrogen Fertilizers	Urea-forms
Soluble	Largely insoluble	Largely insoluble
Immediately available	Readily available in warm weather	Slowly available and controlled release
May burn foliage	No burn	No burn
No odor	Sometimes offensive odor	No odor
Last 3 to 4 weeks	Lasts 4 to 6 weeks	Lasts 24 to 30 weeks
Leaches badly	Leaches	Does not leach
All available	20 to 50% available	All available
Must apply lightly and frequently—every 2 to 3 weeks	Must be applied lightly and frequently—every 3 to 4 weeks	Apply only once or twice a year
Tends to force soft, rapid growth	Intermediate in growth responses	Promotes slow, sturdy, even growth
Requires frequent mowing	Intermediate in frequency of mowing	Requires less frequent mowing

very little difference when the fertilizer is applied. This is one of the secrets of feeding with a solid Urea-form. There will be constant, steady, uniform release of nitrogen whenever the conditions are right for the release of nitrogen through bacterial activity. Thus we can virtually eliminate from our thinking time of application of fertilizer because one or two applications a year of a properly balanced "Blue Chip" fertilizer will suffice. The most popular "Blue Chip" fertilizer today is the 10-5-5, there are some that have a 14-7-7 analysis, some 8-6-2, 10-6-4 and one 20-6-4. All are well balanced for use on lawn turf.

When using a fertilizer containing solid Urea-form, the minimum rate of application usually is considered to be four pounds of nitrogen to one thousand square feet (forty pounds of a 10-5-5 "Blue Chip" fertilizer). Maximum rates may go as high as ten to twelve pounds of nitrogen per one thousand square feet for the season. This higher rate is for the grasses that demand heavier feeding in sections where there is a longer growing season.

It is possible to apply up to eighty pounds of a "Blue Chip" 10-5-5 to one thousand square feet in one application spring or fall with assurance that release of nitrogen will be uniform and steady throughout the entire release period of the Urea-form fertilizer. If these rates of application seem to be high in comparison to what has been used in the past with the old-fashioned burning fertilizers, remember that most lawn turf has been starved.

Here is a simplified statement of nitrogen needs of lawns: Minimum application for ordinary lawns is four pounds of nitrogen to one thousand square feet per year; for a little higher quality, use six pounds of nitrogen. Zoysia lawns require six pounds. A Merion-Pennlawn fescue turf requires six to eight pounds of nitrogen. A Merion lawn should have eight to ten pounds of nitrogen and as high as twelve in the southern parts of the region where the growing season is long. Kentucky 31 fescue turf should have eight to ten pounds of nitrogen. Kentucky 31 fescue and Merion should have the same and Bermuda turf, to be good, should have ten to sixteen pounds of nitrogen.

(Continued on page 134)

REVITALIZING ECONOMIC BOTANY

AT THE NEW YORK BOTANICAL GARDEN

By **David J. Rogers**

THE FRONT COVER ILLUSTRATION of this number of THE GARDEN JOURNAL departs from the usual pattern for two reasons—to call attention to one of The New York Botanical Garden's most illustrious curators, Dr. Henry Hurd Rusby, and to emphasize the continuing interest in the field of economic botany which was so well begun by him.

Dr. Rusby, Honorary Curator of Economic Botany from the Garden's beginning in 1898 until his death in 1940, was one of the most outstanding examples of botanists whose endeavors were devoted to the pure botany of useful plants. He worked in many disciplines, as plant explorer, teacher, researcher, author of scientific and popular works, advisor to governments, and administrator. His collection of economic plants and plant products at The New York Botanical Garden was one of the most complete in the country. He was Professor of Botany and Materia Medica at the College of Pharmacy, Columbia University, from 1889 and served as Dean for twenty-six years until his retirement in 1933. His introductions and discoveries of drug and other useful plants contributed greatly to pharmacognosy and economic botany generally. He was instrumental in the first pure food and drug act of the United States and in raising the standards for pharmacist's education in this country. His works were recognized all over the world; his honors included medals from Great Britain and Germany, honorary membership in numerous societies, and honorary degrees from the Philadelphia College of Pharmacy and Columbia University.

In the same spirit with which Dr. Rusby made his investigations, The New York Botanical Garden is continuing studies of plants of importance to man. To re-emphasize and to increase the value of economic botany, it is sponsoring a conference of interested scientists to be held here on August 12 and 13, 1958.

The problems that confront this conference are manifold. Not all, nor even half, of the questions proposed can be fully answered, but a start must be made. Some of the problems are rather fundamental, for example, the limits of the field, its objectives, ways and means by which students may be attracted to the botany of useful plants, and financing for advanced study and research.

It is surprising, perhaps, to hear of the need for further botanical study on plants which man has long known and used. Have not these studies been completed already? Unfortunately, the answer is no. It is true that many studies of the more practical problems of economic crops have been more fully investigated, but the botanical study has not kept pace.

All too few scientists are engaged in studies of the botany of economic plants. Perhaps there is a good reason, in that there has been no meeting ground, no society for those who do devote their time to a program of research in this field. But there are other reasons. There has been one school of thought in the United States and in Europe, from which many ideas were transported to our institutions, that if botany were to be a pure science, it must have nothing to do with a plant which is useful to mankind. Fortunately, this idea is fading, but not fast enough, when so much depends upon the investigations in the pure sciences with plants that feed, clothe, protect, please, or be-devil man.

Most fields of botanical and chemical science can be employed profitably in studies which are not only of extreme importance to the sciences themselves, but which will also yield knowledge of practical application. In these days when space travel is nearly a reality, it is imperative to remember that there are still areas of the earth's surface which are practically unknown botanically. This applies largely, of course, to arctic, antarctic, and tropical areas which present more problems for exploration than do temperate zones. The botanical problems have shifted to some extent, however, from exploratory and descrip-

(Continued on page 118)

INDIAN NARCOTICS
in Southern Venezuela

By J. J. Wurdack

A botanical specimen of *Piptadenia peregrina* (L.) Benth., the primary source of Venezuelan snuffs.

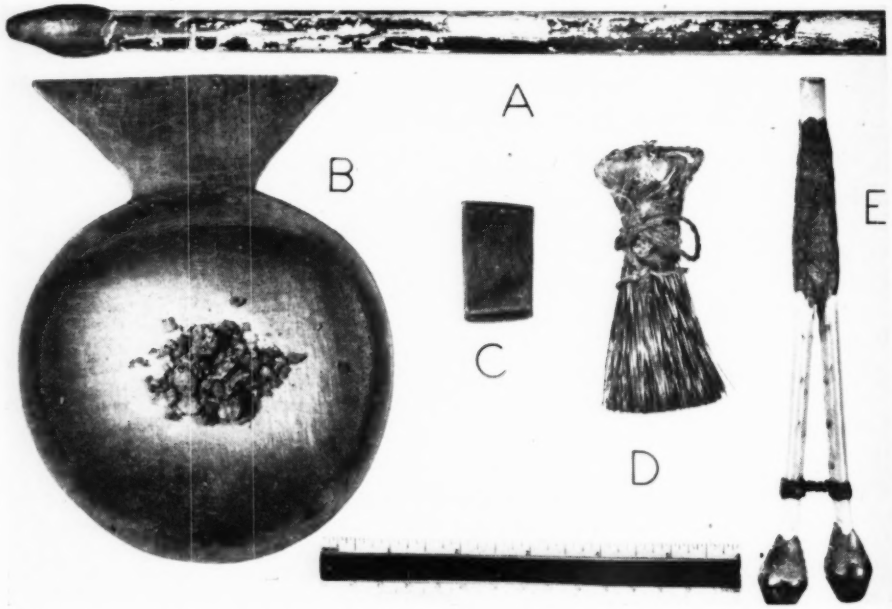
IN A RECENT SERIES of articles in the Harvard Botanical Museum Leaflets (1954, 1955, 1957) R. E. Schultes has published extensive new observations on the interesting narcotics used by Colombian and Brazilian aborigines. Dr. Schultes emphasized the still-existing gaps in our knowledge of the rapidly disappearing Indian cultures, deficiencies also noted by J. M. Cooper in his summary of published data on narcotics and stimulants (HANDBOOK OF SOUTH AMERICAN INDIANS, Volume 5, 1949). The New York Botanical Garden's Venezuelan expeditions for the last ten years have mainly been to the uninhabited plateau mountains; still there have been obtained some additional notes on Territorio Amazonas narcotics which supplement the information gathered by Schultes and his predecessors in this interesting facet of ethnobotany. The Guaika, Maquiritare, and Piaroa vernacular names were obtained through the assistance of the New Tribes missionaries at Tama-Tama and are accented in accordance with the dictionaries being prepared by these Americans; otherwise, the vernacular names used are in phonetic Spanish.

Our observations deal mainly with the Guaikas, Piaroas, Maquiritares, Baniwas, Yaviteros, and Barés of Venezuela; the Kuripakos of the Río Guainía barely get into Venezuela, while the Colombian Piapocos and Puinaves of the Ríos Guaviare and Inírida occasionally visit Venezuela. The Guahibos of Colombia frequently visit Venezuela; the Kuibas, a degenerate offshoot of the Guahibos, are notorious for their thievery, especially of cattle, along the Colombian side of the Orinoco between Puerto Carreño and Puerto Ayacucho as well as in the Venezuelan llanos between Puerto Paez and the Río Cinaruco. The Baniwas, Barés, Yaviteros, and Yavaranos are culturally nearly extinct, although the first two tribes were important along the Ríos Casiquiare and Guainía at the time of Richard Spruce's visit there about a hundred years ago. Of all the Indians in Territorio Amazonas, perhaps the Guaikas, Maquiritares, and Piaroas have best maintained their cultural identity; however, the advent of the outboard motor has greatly facilitated access to these three tribes, and their aboriginal habits will probably be destroyed by civilization in the near future.

TOBACCO

Three cultivars of tobacco are recognized by Territorial Venezuelans: *rabo de gallo* and *lengua de vaca* (both said to be native) and the ordinary broad-leaved *N. tabacum* (usually called simply *tabaco* and said to be introduced). All Territorial tribes except the Guaikas smoke tobacco, either as cigars or wrapped in the papery bark of *Couratari* sp. We have not seen tobacco snuff in use in Venezuela, although this usage is apparently common in Amazonian Colombia and adjacent Brazil. The Guaikas seem unique among present-day Venezuelan Indians in chewing (or sucking) tobacco. Guaika men and women carry a cud *(bee naijic)* inside the lower lip, with the resulting prognathous appearance enhancing their general primitive aspect; they suck the cud throughout the day and at night carefully store it on the ground or in a tree crotch near their primitive bark hammocks. The Guaikas grow only the *rabo de gallo*.

The Guaikas are otherwise of eth-



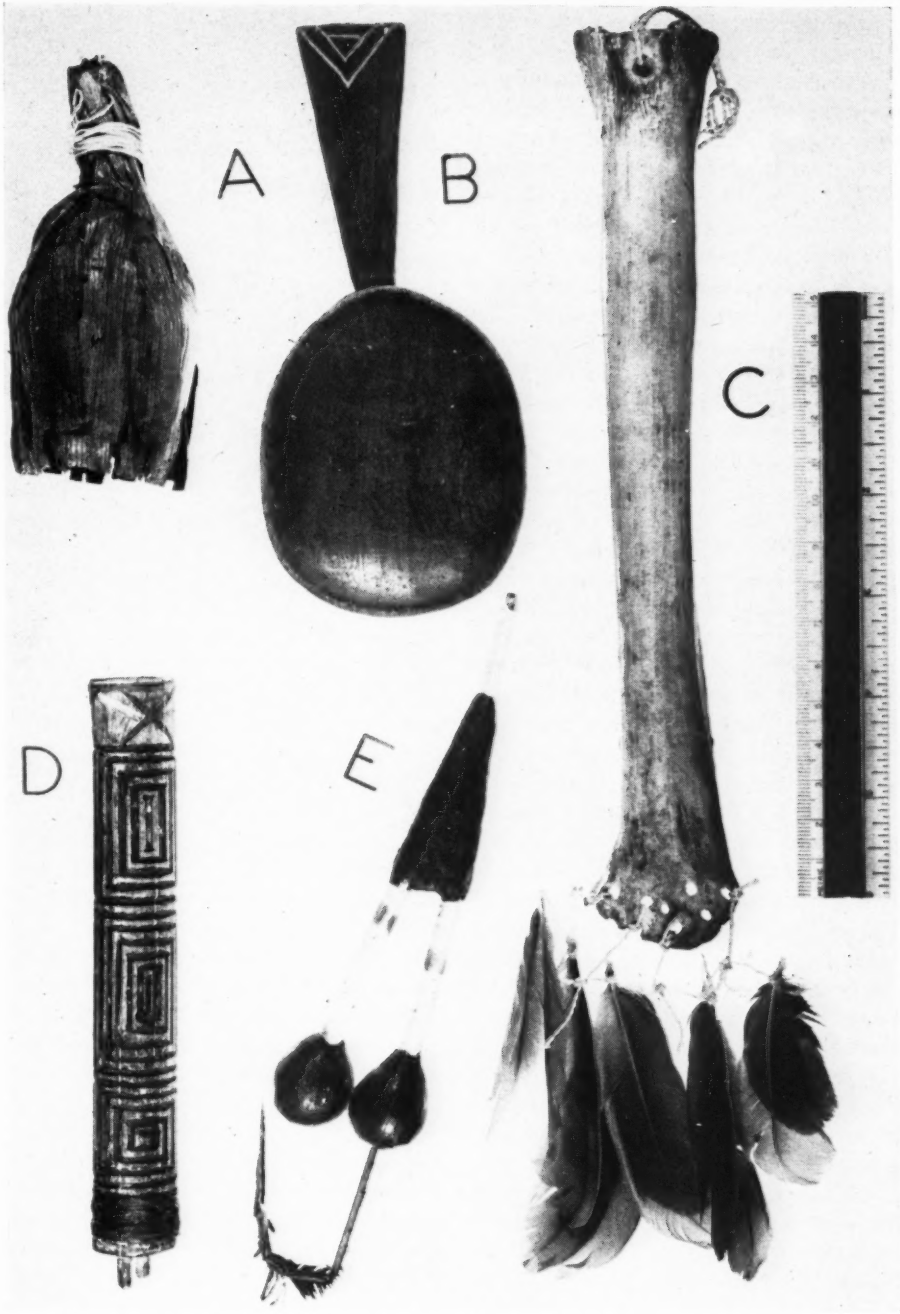
(A) Guaika snuff tube. (B-E) Piaroa snuff equipment. (B and C) "Mortar" and "pestle" for crushing snuff. (D) "Whiskbroom" for amassing the powder. (E) The inhaling tube.

nobotanical interest. Split sections of the stem epidermis and cortex of a tall grass *(Oryza latifolia* Desv.) are used by them for hair cutting. Their agriculture is based primarily on two planted crops, the peach palm *(Pijiguao* of the Venezuelans, a *Bactris* sp.) and the plantain and banana, with emphasis on the latter two. The tribe, since the post-Colombian introduction of the banana, has apparently shifted from a nomadic forest existence to a highly successful agricultural system and is rapidly increasing in numbers. This startling transformation has made them probably the most populous tribe of northern South America. James Barker, whose publication *"Memoria sobre la cultura de los Guaika"* (Bol. Indig. Venez. 1: 433-489. 1953) is the only recent reliable source of information, estimates their number at over ten thousand in Venezuela alone and the tribe is also found in adjacent Brazil. Population pressure and intervillage warfare are gradually extending the tribe down the Orinoco closer to civilization. The original source of the *platanos* (on which most of their population increase is apparently based) is unknown, although a Jesuit mission once existed on the Río Mavaca to the west of most present-day Guaika villages; Barker, however, says that Guaika legends indicate that the tribe has moved from the east. Apart from their agricultural advances, the Guaikas culturally remain probably the most primitive of the Indians of northern South America.

Hallucinative Narcotics

Yopo, a snuff produced from the seeds of *Piptadenia* spp. (in northeastern tropical America, *P. peregrina* [L.] Benth.) is in general use among the Guahibo and Piaroa males. Through the courtesy of Felix di Giovanni, a set of the Guahibo *yopo* apparatus has been on display at the Garden for the last year. The Garden also has a set of Piaroa *yopo* equipment obtained by Dr. Bassett Maguire in the Río Ventuari.

In 1916, W. E. Safford, of the United States Department of Agriculture, summarized the use of *Piptadenia* snuffs in tropical America (J. Wash. Acad. Sci. 6: 547-562). The snuff was noted from Haiti (as *cojoba)* at the time of Columbus and was reported from Venezuela as extensively used by



Guahibo snuff apparatus collected by Felix di Giovanni. (A) Snuff bound in palm leaves. (B) A wooden paddle, used for mashing the moistened snuff with the ash of a nut. (C) Jaguar shinbone decorated with parrot feathers, in which the snuff is carried. (D) Snuff holder made from *guadua* (a thorny bamboo). (E) Inhaling tube, of heron bones held together with a pitch capped by palm nuts containing a cormorant feather used as a "pipe-cleaner."

Vernacular Names

Tribe	*Tobacco*	*Snuff and Botanical Sources*
Baniwa	Eeri	Nopo *(Virola* bark)
Baré	Aari	
Guahibo	Tsema	Yopo *(Piptadenia* seeds)
Guaika	Bee	Ebānā (*Sources* unknown)
Kuripako	Yeema	Yatoo *(Virola* bark)
Maquiritare	Cawai	Acuja *(Piptadenia* seeds)
Piapaco	Zeema	Yuuba *(Piptadenia* seeds)
Piaroa	Jāt'e'	Yu'ā' *(Piptadenia* seeds)
Puinave	Jop	Noopa *(Piptadenia* seeds); Yakee *(Virola* bark)
Yavitero	Yema	

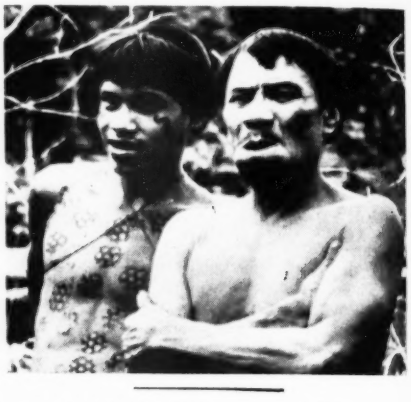
the now-extinct Ottomacs of the middle Orinoco by Padre Gumilla (as *yupa)* in 1741; Humboldt gave an elaborate description of the Ottomac use (as *niopo)* at Uruana (La Urbana). *P. peregrina* is still an abundant constituent of the rather dry savanna edge forest of the rolling *llanos* south of the Orinoco, but, apart from the Indians, present-day Venezuelans in Guayana have not adopted *yopo* use. Elsewhere in South America, the seeds of other species of *Piptadenia* have been used for narcosis, in southern Peru as *huillca* and in Argentina as *sebil.*

The Piaroas are avid *yopo* inhalers. They annually visit the savannas of the upper Río Ventuari and those of the middle Río Parguaza specifically to get mature *Piptadenia* seeds. The bark of *Coco de mono* (a species of *Lecythidaceae)* is burned and the ashes added to the pulverized seeds to complete the narcotic prescription. While Schultes believed, from Koch-Grünberg's description of a Ventuari narcotic, that *Virola* bark-exudate was used in the Ventuari drainage, we have found no such present-day evidence. Don Melisio Pérez of San Juan de Manapiare, who is the docent for Ventuari Indian lore, knows of no tribes in this drainage using bark-exudate. One sample of Piaroa snuff, obtained by Dr. Maguire from Río Ventuari Piaroas, was examined by Dr. Heber W. Youngken of the Massachusetts College of Pharmacy; Dr. Youngken found that the prepared snuff was definitely from *Piptadenia* seeds.

The few Ventuari Yavaranos and Atabapo Yaviteros still extant apparently use no hallucinatives. The Colombian Piapocos and Puinaves are familiar with the Venezuelan *yopo,* and Dr. Schultes has personal knowledge of *Piptadenia* use by these two tribes (especially the Puinaves). Among the Maquiritares, Kuripakos, and Baniwas, the use of hallucinatives is restricted to the medicine men; of these three tribes, the first uses *Piptadenia yopo,* while the other two use *Virola* bark-exudates. One Maquiritare from the Río Cunucunuma headwaters also reported the use of a drink prepared from the bark of a blue-flowered vine *(caji).* Dr. Maguire was told by a Ventuari Piaroa that they also use the vegetative parts of a bush for preparing a snuff. As yet, we have not found Venezuelan *caapi,* a narcotic drink from the bark and/or leaves of *Banisteriopsis caapi* (Spr. ex Griseb.) Morton. However, Spruce saw *caapi* in use, as a drink or chewed, among the Guahibos around the Great Rapids of the Orinoco. Likewise, we have not found *coca* in use among present-day Amazonas Indians.

Among all tribes using snuff except the Guaikas, the powder is inhaled in a one-man operation through a bifurcated tube prepared from the legbones of various herons. Among the Guaikas, however, a single bamboo tube is used, with one man blowing the snuff into another's nostril. The botanical sources of the snuff, used by all male Guaikas, are still unknown. Barker knows of at least three kinds of distinct differences in strength. The strongest comes from the Río Ocamo, with two weaker kinds from along the Orinoco; one of the Orinoco snuffs is said to be produced from a tree bark and the other from a "small" plant which grows in the agricultural clearings. The Guaikas are copious users of snuff, with some drug addicts; they will even barter their few precious machetes to surrounding villages or tribes when their own narcotic stock is exhausted.

Above. Piaroas at Salto Maraca on the upper Río Parguaza, on their annual pilgrimage to the lower Parguaza savannas to collect *Piptadenia* seeds.



Right. Guaika men, with tobacco-cuds, at Majekodo-ko, a village on the upper Orinoco.

ECONOMIC BOTANY (from page 115)

tive to those of the more interpretive sciences. The classification of plants, for example, although incomplete and largely descriptive, provides a background of information upon which students may improve our knowledge of the large numbers of variations in plants of economic importance. That which is known of the chemistry of plants with relation to their life processes is limited to the most fundamental aspects. Much time may be spent profitably in investigating the methods by which plants produce certain substances of economic value as drugs, foods, fibers. In many cases plants taken directly from the wild do not lend themselves to intensive cultivation; the environmental requirements are not known and must be studied on a fundamental level. Only by long and arduous study of these requirements by ecologists, physiologists, and bio-chemists can basic information be furnished on which agriculture can be prepared to cope with

the demands of a continually increasing world population.

In order that the conference on these diverse problems will be fruitful, scientists from several disciplines will work together. From their discussions, we hope to settle on objectives, to decide on methods of achieving these objectives, and to make further progress in the field so well founded at The New York Botanical Garden by Dr. Rusby.

THE AMERICAN SPECIES OF IRIS

By B. LeRoy Davidson

Continued from May-June issue

Among the Californicae Series can be found some of the most beautiful and variable of all irises. In nature they occur in the three states bordering the Pacific Ocean, preferring the moisture of the Pacific slope in contrast to the drought of the Great Basin of *I. missouriensis*. They are a natural group of close allies, growing in a geographically rough territory, and each of the approximate dozen species is separated from the others by a mountain range or a definitely different climatic barrier. Whenever two species are found growing in proximity, a range of intergrades or plants of hybrid origin can usually be found. Thus to the collector it may seem a highly confused group, and at least five of the species are naturally most variable, spoken of as "polymorphic" species, while only one or two are constant or relatively non-variable. In this series of Apogons, as in the Hexagonae, is evidence of evolution in a greater degree than in most.

As in the case of a great many western American plant populations, the distribution is northward and southward of the ancient Siskiyou Mountain range, approximately at the California-Oregon border, and west of the Cascade-Sierra chain. Only one species is found in any great numbers both north and south of the Siskiyou barrier, and this one is distributed along the shores of the Pacific. *Iris tenax*, one of the variable species, is the most northerly in extension and the only one occurring in Washington state. As might be expected of a northern species, it is deciduous in the dormant winter state, the only species to be consistently so. It is most numerous in the lower valleys of the Willamette and Cowlitz water sheds, and has the curious faculty of being paler in coloring in its northern forms and deepening in color toward the more southern ones; those in the region of Eugene and Cottage Grove, Oregon, are rich purples, while those nearer the Columbia River and over into Washington are invariably a pale orchid tint. There are two very definite yellow color forms, which have been given distinct names; and where the purple to orchid colors merge with the yellow may be found natural colonies where no two individuals are of the same coloring. Here the pinkest of irises may be seen, as well as raspberry, fuchsia, pale to medium blue and all manner of variation, many with an inverted V-shaped signal or "flash-mark" on the haft of the falls. *Iris Gormanii* is the yellow form in Oregon, now more properly called *I. tenax* var. *Gormanii*.

Iris Hartwegii is a yellow-flowered and relatively constant species closely allied to *tenax*, found only at relatively high altitudes on the west slopes of the Sierras and somewhat across the northern end of the Great Valley of California and into the coastal mountains of northwest California. It may sometimes be found in orchid shades but is usually pale yellow with veined falls. A purple-colored form is found at the extreme southern end of the distribution of *Hartwegii*, in the San Bernardino Mountains at high altitudes, and it has been given the name of *I. tenax* var. *australis*, though once called *I. Parishii*. A tall, large-flowered blue species from the low valleys south of Yosemite has the distinction of being the only one of this closely allied group not to have the bases of the leaves stained with red, and likewise of being the bluest in color. This is *Iris Munzii*; it is very beautiful but a tender subject in northern gardens. The foregoing species of Californicae are alike in the botanical distinction of having the spathe valves, which enclose the buds, borne at different ranks on the stem rather than opposite each other, as in the following species.

The one species found both in California and Oregon in good numbers is *Iris Douglasiana*, of maritime distribution along the Pacific, not found far inland from the moisture-laden atmosphere and tolerant of more water in gardens than the other species, which will perish from lack of good drainage in the soil, as naturally occurring in open slopes. It is found in constant association with the coast redwood *(Sequoia sempervirens)*, displays much variation in botanical characters and in the coloring of its flower, and is one of the polymorphic species. With such a wide range to its distribution, it has ample opportunity to mingle and mix with at least five or six other species, and this further adds to the variations. The colors are of such range that it is called the "rainbow iris;" they are as varied as in *tenax*, but *Douglasiana* is a very much-branched stem, which may grow to three feet and bear from six to a dozen or more flowers, whereas the other species bear from one to usually two or three. Its distribution would lead to the assumption of intolerance to frost, and it is tender, its northern extension in Oregon apparently stopped by the occurrence of much frost along the Pacific Coast. Many species have been named which are more precisely among the natural variants of *I. Douglasiana*, particularly among the natural hybrids, and they cannot stand taxonomically as "good" species because of the inconstancy in succeeding generations growing from seed. This, the bane of these species to the botanist, is the great joy of the gardener, and a number of named variations of *Douglasiana* have been introduced into commerce, both collected and of garden origin, many with an infusion of blood of other species.

Two rather similar-appearing species, one found north of the Siskiyous, the other south, are *I. bracteata* of Oregon and *I. Purdyi* of California. The former is the only Californicae species to be found only in yellow, the falls usually lightly veined in a reddish pattern, giving a great brilliancy to the flower, which is of good size and great beauty of form, borne atop a stem growing to a foot and a half. In nature it has a population of lesser stature, identical except for size, about two-thirds that of the typical, and constant in its own colonies, as is the type-form in its own areas. This species grows naturally in gravelly soils in association with yellow pines, a dryland species, and could therefore be expected to be very drought-resistant, once established in gardens, and its altitude in nature makes it

necessarily frost-resistant. *I. Purdyi* occurs mixed with *Douglasiana* and at least one other species, and is extremely variable. It is one of the loveliest as to shape of flower and occurs in variations in yellow and purple, usually pastels, and in admixtures, some very pink in color. It is also somewhat tolerant of dry conditions.

The most admired and publicized of all these species of Californicae is *Iris innominata*, the one whose name means "nameless" because, although it was known to the settlers of its mountain home for many years, it was overlooked by botanists until recently. It occurs naturally in the watersheds of the north and west-flowing rivers of the Siskiyou watershed, and is usually thought of as golden-yellow, though in nature it is extremely variable, may be solid purple, or any mixture of yellow and purple, usually of brilliant contrast, whereas in others these mixtures are usually more subdued in their intensity. Some of the most striking may be nearly orange, a pattern of reddish veins placed closely on the petals. Some nearly true-red have been selected in gardens. In shape the flower is among the most beautiful of all irises, often wide-petaled, and with usually undulating, full margins; the flowers sit on low stems among the handsome grassy evergreen leaves in a most elegant manner. Some of the most valuable of the hybrids introduced into commerce from the Californicae irises have a high amount of *innominata* blood in them, for all the good qualities except the branched stem are found in this species.

The five additional species are alike in that all have a very long tube attaching the petals of the flower to the ovary below, and this tube may exceed the length of the stem in many cases. This is a distinct botanical character, though it may not be an admirable quality in the garden, for such fragile "stems" are easily broken, though, in some instances, they are enclosed within a sheath composed of the stem-leaves and spathe-valves. Of these five, only one is found to the north of the Siskiyou barrier, and this is *Iris chrysophylla*, the name, meaning "yellow-leaf" in allusion to the coloring of the foliage even though it is no more a pale yellowish color than some others. Called the "little white iris" by the natives from central Oregon and across the southern part of the state to the east slopes of the Coast mountains, it is a pallid creamy yellow to nearly white, with faint bluish veins on the falls; it may sometimes be a pale blue-white. The stem may be only an inch or less and the total height of stem and flower only a few inches, or it may grow to a foot, with the stem leaves close-clasping.

Iris tenuissima, also a pallid yellow to white, differs in that it gives a more slender appearance, and occurs across the northern end of California, though at a lower elevation than the aforementioned *I. Hartwegii*. However, they do merge and mix in some places. *I. chrysophylla* and *I. tenuissima* are alike unto themselves and different from others in having the standards broadly flaring rather than erect, and the style-arms ornamented by long feathered crests, extending upwards, giving the flower balance.

Iris Douglasiana

Iris macrosiphon, whose name means "long-tube," is entirely Californian and has the opportunity to mix with many others in its wide range from south of San Francisco Bay northward in the east slopes of the Coast Range, across the valley and in the west slopes of the northern Sierras. It is one of the most polymorphic of species, often referred to as the "Macrosiphon Complex." The usual color of *macrosiphon* is deep purple, but its variations include pale yellow, apricot, orchid, and the other colors known in *tenax* and *Douglasiana*. Many of the named hybrids in commerce have blood of this species, which gives a broad-spreading flower and neat, narrow evergreen foliage. *Iris Fernaldii* and *I. pinetorum* are alike, as the remaining two Californicae species, in their relatively shorter tube above the ovary, a botanical character that may add to their garden value. The former is found between *macrosiphon* and *Douglasiana*, is rather intermediate though stable, and is therefore regarded as a good species. *I. pinetorum* is found between *tenuissima* and *Hartwegii* and is likewise intermediate, also stable and a good species. As garden plants, these two are not as attractive as other similar species, though *pinetorum* should be both drought-resistant and frost-tolerant.

Among the populations of the species of irises, as among other plants, can usually be drawn similarities that belie relationships, and these are borne out by scientific investigations and the certainty that if two entities can be induced to hybridize together, they must bear some relationship. Curiously, among American irises are two species that seem to stand alone, without any close relatives existing today. In eastern United States, such a plant is *Iris verna*, found in the general range of *I. cristata*, the Alleghany states, and appearing similar, though evergreen, whereas *cristata* is deciduous. This strange *I. verna* is a little dwarf a few inches high; the flower has the appearance of that of a dwarf bearded iris of the botanical grouping Pumilae, except that it does not have a beard. In the garden it is valuable for carpeting woodland, and an acid soil seems to be necessary for its long endurance. In color it is white to cream and lilac to a medium purple, with a colorful spot. In western United States, found with *I. tenax*, is such an anomalous species, *Iris tenuis*, indigenous to a rather small and remote area in Oregon, on the lowest western slopes of Mount Hood. This one seems to be intermediate between the beardless and the crested irises, appearing like a huskier *cristata* with a branched stem as in the Japanese crested *I. gracilipes*, except, of course, that it has not the qualifying crest on the falls. It is a very charming woodland subject, the long stoloniferous rootstock rambling about in the duff of evergreen needles; in the garden it should be treated as the native orchids,

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RETHINKING ROSE GROWING

By **Allen D. Albert, Jr.**

THERE COMES A TIME for taking stock in the pursuit of any art or science. This is true of any horticultural practices and especially so at this time of advance in chemistry, general research, and pathological knowledge. Where roses are concerned, the materials are here for an evaluation of much we have been taking for granted for a long time.

Pruning is the first practice to have come under close scrutiny by the experienced rose grower. A general book on gardening of an incredible circulation states the old idea: "If the object is the production of exhibition blooms, the bushes should be cut almost to the ground, only three or four canes being left on each bush and not more than three growth buds being allowed on each cane." The author goes on to say moderate pruning of a half dozen growth buds will produce more bloom of inferior calibre. Now this is not an old work but one of only three or four years ago. It does not need saying that no serious rose grower of my acquaintaince would dream of this "whacking-school" practice today. Indeed, when in the March 1955 issue of the American Rose Magazine I spoke of this as a school of thought, the editor inserted a footnote which stated, "This method is now in almost general disrepute." I most sincerely hope so; most of us have long known that it takes a strong, vigorous bush to produce any quantity of creditable bloom. My own method is to remove old, woody, unproductive growth whenever I detect it and certainly any which is spindly or diseased. At pruning time vigorous canes are preserved practically for their entire length and little besides twiggy or crossing growth is removed, Beyond the opening up of the bush to allow sanitation and ventilation and shaping of the bush for a pleasing effect nothing else is done.

As to the time of pruning, however, I have been much more radical in late years. It has seemed to me that the generally accepted practice of waiting until the spring, indeed until the first growth buds appear, leaves considerable to be desired. Bushes secured from a nursery are invariably pruned—they could not be conveniently shipped if they were not—and yet have a habit of catching up to established bushes before too long a time. I would not advocate such sharp pruning habits as this, but it seems to be a point that early pruning does no real harm but rather imparts vigor to the new growth. With this in mind, as well as the factor of sanitation, I have completed my real pruning the last two years as soon as the bushes have gone as nearly dormant as they do down here in the South, which is when new growth stops and the old foliage appears lifeless. The danger of forcing out new sappy, easily killed growth has proved to be entirely false, and the new growth in the spring has proved to be exceptionally vigorous, as it should since strength has not gone into older growth destined to be removed. In other words, wanted growth has not had to share with unwanted. With the sap not running, die-back has been at a minimum and injury-caused canker much less.

It is in *sanitation*, however, that this practice has proved most beneficial. Such pruning removes the source of much carry over infection and, if accompanied by removal of every single leaf, which it should, and digging out of old mulch, which I highly recommend, goes very far in eliminating not only blackspot but other diseases and a host of insect pests as well.

For two years now I have completed pruning by Christmas. Following this the mulch is dug out and carted off to the compost heap. This leaves the surface of the beds exposed, and they are left this way through our coldest freezing weather for a full month. Toward the end of January entirely fresh mulch is applied. Since I have the beds dug out below the graft bud, this supposedly tender part of the rose bush is left subject to freezing weather. Losses are negligible, despite the fact that the past winter—1957-58—is the coldest in Atlanta's recorded history and comparable to areas considerably farther north. The bush receives no winter protection whatsoever. One caution needs to be emphasized, however, and that is for the "digger-outer" to be sure his spade does not injure the canes. Such injuries breed canker and must be carefully avoided. If winter cover is absolutely required, and I was never convinced of this when growing roses in the Chicago area, the mulch should still be removed and new, clean soil heaped up. Washing this away with a hose in the spring avoids spade damage at that time. It should be emphasized that moisture retaining materials should not touch the rose bush during the alternate freezing and thawing weather of winter.

As a mulch I use two shovelsful of old cow manure to one of peat moss well mixed together. When removed I never use this again in the rose garden, but it is sheer riches for other parts of the garden.

Such extreme sanitation has an unbelievable effect on the rose garden. My last spraying was last May—a year ago—and I am without blackspot or mildew. I did use a general purpose spray after pruning but only twice, a week apart, and at regular strength. I avoided heavy dormant sprays, such as lime-sulphur, since I am convinced I burned my bushes badly in previous years when I used the recommended strength.

For insect control I have turned to systemics. Last spring I began a light use of "Systoban" (now "Stemite") and was free from all insect troubles, thrip, aphids, midge and, worst of all, red spider. While I have not found this material as dangerous to use as I had been warned, nevertheless I have worn

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Where Some of THE CRAB-APPLES Come From

By **Donald Wyman**

Malus coronaria charlottae was discovered in a pasture in Waukegan, Illinois.

AT THE PRESENT TIME there are over one hundred and twenty-five species and varieties of ornamental crab-apples being grown by commercial nurserymen in the United States and Canada. They come from widely separated places in the northern Temperate Zone. Only a few of those now being grown are natives of North America, since it is these natives that do not have colorful fruits like the Oriental species; also, native American crab-apples have proved more susceptible to the juniper rust disease than have the others.

Some species, such as *Malus floribunda* and *M. baccata,* have outstanding ornamental value, but by far the greater number of crab-apples that are now valued ornamentals are hybrids. The species of the genus *Malus* hybridize readily one with the other. It has been found that only a few, like *M. sikkimensis* and *M. Sargentii,* come true from seed. Consequently, when a promising seedling occurs, it is frequently extremely difficult to spot its true parentage. Let us consider some of the modern crab-apples (and there was many another grown during the last seventy-five years that has now gone out of cultivation) and see just how they originated or came to this country.

Some of these plants have originated in the wild here in America. Take, for instance, the Bechtel crab-apple *(M. ioensis plena)*. One tree was found in an old fence row near Staunton, Illinois, sometime between 1840 and 1850 by E. A. Bechtel, noticed because it had beautiful double flowers while all the other prairie crab-apples thereabouts had single flowers. It has been propagated asexually ever since.

Another, the Charlotte crab-apple *(M. coronaria charlottae)*, was discovered in a pasture about 1902 in Waukegan, Illinois, by a Mr. de Wolfe. He immediately named it after his wife, Charlotte. This also must have been brought to the attention of Mr. de Wolfe because of its double flowers, whereas the wild sweet crab *(M. coronaria)* has completely single flowers.

Some of our best Oriental crab-apples are introductions direct from their native habitats in the Orient. Such would be the tea crab *(M. hupehensis)*, the cutleaf crab *(M. toringoides)*, the Sargent crab *(M. Sargentii)*, and many others brought over to America by the Arnold Arboretum, Jamaica Plain, Massachusetts, at various times as a result of the explorative trips made by E. H. Wilson and Charles Sprague Sargent. Then, there are some hybrids that have been grown in cultivation in the Orient for so long that no one knows of their origin. Examples are the carmine crab-apple *(M. atrosanguinea)*, the Nippon crab-apple *(M. brevipes)*, and the Chinese flowering crab-apple, *(M. spectabilis)*, none of which has been found in the wild in China or Japan, but has come to us through the efforts of uncounted generations of Oriental gardeners.

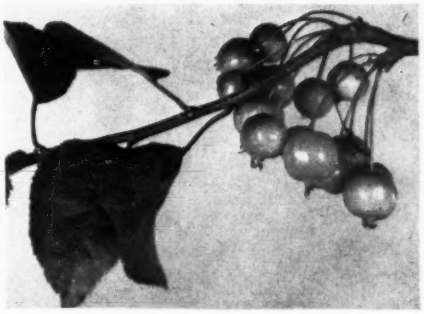
The most outstanding example in this group is the Chinese flowering crab-apple. This is an extremely variable species, and one of the first records of its appearance in the Western World is the fact that it was grown in the garden of Dr. J. Fothergill in England in 1750. It was probably delivered to him from some trader's sailing ship, obtained in the Orient where it had been grown and appreciated by generations of Chinese gardeners. This, too, has never been found in the wild, but it is easy to understand how and why it has been handed down from one generation of gardeners to the next because of its outstanding beauty.

It can be easily understood how the English nurserymen cherished this over the early years of the last century (before the large number of Oriental crab-apples were imported), and how one may have been sufficiently interested to plant seeds and make his own selection of seedlings, or else be unusually observant and select a sporting branch. In any event, the Rivers crab-apple *(M. spectabilis Riversi)* originated in the nursery of Thomas Rivers in England, about 1872, and has the largest double pink flowers of any *M. spectabilis* type.

Many varieties have originated by chance and have been noticed by some discerning individual and propagated. The Arnold crab-apple originated as a chance seedling in collections of the Arnold Arboretum, about 1883. It was determined a cross between *M. floribunda* and *M. baccata,* and certainly has proved an excellent ornamental through the years. A newer seedling originating in the same Arboretum is 'Dorothea,' which is one of the best of the yellow-fruited, double-flowered varieties. It was found in flower among a group of other seedlings, and when noted first in fruit, it was evident that this was an excellent ornamental.

There have been carefully planned breeding programs in this country and abroad, which have resulted in some outstanding varieties: 'Henrietta Crosby,' originated at the Arnold Arboretum in 1939 as one of several in such a program; 'Red Jade' from the Brooklyn Botanic Garden (1953), a beautiful pendulous form; and several in the extensive plantings at Des Moines, Iowa, overseen by A. F. denBoer, such as 'Patricia,' 'Ormistan Roy,' and also 'Evelyn.'

The Siberian crab-apple, a native of northeastern Asia and northern China, was first introduced into Kew Gardens in England about 1784. Shortly thereafter it was brought to America, probably as seed, and a long series of experiments was started in which this was crossed with some of the large apple types with the idea of producing a hardier apple for the northern parts



The yellow fruit, above, and double flowers, right, of the crab-apple 'Dorothea' which originated in the Arnold Arboretum.

of the country. Many hybrids did originate in this way, and because of the popularity of this species in such breeding programs, many varieties were introduced and grown throughout the apple-growing regions of the northern United States and southern Canada. The Canadian Experimental Station at Ottawa especially entered into this type of breeding and produced many hybrids, too many of which were unfortunately named. Of the better ones, 'Osman' and 'Columbia' were among those very resistant to fire blight.

This interest on the part of the main Canadian Experiment Station was carried over into some of the sub-stations, especially that at Morden, Manitoba. Here, such good ornamental varieties as 'Almey' (1945), 'Strathmore' and 'Sundog' (1949) have originated and have been named, after which they have become widely circulated among commercial growers in the United States. Other Canadian Experiment Stations have introduced more recently 'Arctic Dawn' and 'Snowdrop,' both of which are supposed to be the only crab-apples withstanding the extremely cold winters of Beaverlodge, Alberta, Canada. It should be noted also that Percy H. Wright of Moose Range, Saskatchewan, grew many seedlings and finally selected one he named 'Midnight' (1953), which is the only one withstanding winter temperatures of -55° F.

Dr. Niles E. Hansen, formerly of South Dakota State College, Brookings, South Dakota, also entered into breeding in order to find hardier apples. As a result of his many experiments and selections, today we have 'Dolgo' (1897), 'Hopa' (1920) and several others. Other state experiment stations have also produced some varieties as, for instance, the New York Agricultural Experiment Station introduced 'Van Eseltine' (1938) and the Department of Horticulture of the University of Minnesota 'Radiant' and 'Centennial' in 1957.

European countries have had their crop of hybrids also, many of which are valued today. 'Oekonimierat Echtermeyer' a weeping variety, originated in the great Spaeth Nurseries of Germany in 1914. *Malus purpurea (M. pumila niedzwetzkyana* x *atrosanguinea)* originated first in a seedling lot in the nurseries of A. Barbier, Orleans, France, before 1900. The Eley crab was first raised by and named for Charles Eley in Bergholt, Suffolk, England, before 1920 and the beautiful *M. purpurea aldenhamensis* was a chance seedling raised by the Hon. Vicary Gibbs in England, about 1920.

Sometimes the exchange of seed results in new plants. For instance, in 1933, seed of *Malus toringoides* was sent by the Arnold Arboretum as a gift

Left. *Malus spectabilis*

Below. *Malus purpurea Lemoinei*

Fruit of *Malus Sargentii*

to Major F. C. Stern, Goring-By-The Sea, Sussex, England. The fruit of a few seedlings proved to be larger than the species, and this fact was noted by Major Stern and reported to the Arboretum. Finally, scions were sent and when these grew into trees and fruited at the Arboretum (after a particularly trying period of near-death by fire), they did prove larger, were named var. *macrocarpa,* and interestingly enough, it appears that a sizeable proportion of the seedlings are identical with the parent.

Another interesting instance of seed exchange occurred when a representative of the Division of Plant Exploration and Introduction of the United States Department of Agriculture collected miscellaneous seeds in the Arnold Arboretum in 1919. Apparently, from this lot grew many hybrid seedlings, scions from one of which were sent back to the Arnold Arboretum for trial in 1930. The double pink flowers of this plant have more petals than do those of *M. ioensis plena* and the leaves are narrower. It was named 'Prince Georges' by the Arboretum in 1943 (after the county in Maryland where it was originally grown).

Then there is always the plant that has grown in the public eye for many years, but no one has been sufficiently interested to note its merits and introduce it. Such was the case with a tree, a seedling of B. H. Slavin's growing in Durand-Eastman Park of Rochester, New York. The flowers were double, nearly two inches in diameter, and it was a beautiful sight whenever it bloomed. A conspicuous tree for many years, it was not named and introduced until 1943, then receiving the name 'Katherine.'

These are only a few case histories, but one can rest assured that there must be some interesting story connected with the beginnings of every crab-apple, either of long and painstaking experiment and the elapse of many years until the final selection was made; or the quick, competent observance of a markedly new seedling which might otherwise have gone unnoticed. So it is readily seen that many, many individuals during many hundreds of years have painstakingly aided in the breeding, selection, and growing of crab-apples, resulting today in a truly wide selection of beautiful ornamental trees. Modern gardeners are, indeed, truly indebted to these observant individuals.

IRIS (from page 120)

dainty woodsy treasures. It is a pale lilac, nearly white, with a few purple veins and a yellow spot.

Nature was generous in supplying us with so many fine native American irises. There are plants for the pond, the marsh, the meadow, and the woods, as well as every situation in the garden. It should be part of our heritage not only to protect them, but to study them and perpetuate the best ones in gardens. Almost every one is readily grown from seed, and the period from planting to blooming is only from two to four years —surely a short time to wait for some of the choicest and most enduring plants we can grow.

ROSES (from page 121)

my "dishwashing" blue rubber gloves and avoided breathing the stuff more than I had to. I use it at about half recommended strength or a tablespoonful to the plant scattered around it and watered in.

Perhaps I shall have to spray occasional isolated bushes at times. If so, I plan to use one of the new 'Aerosal' bombs which I have used with good effect on our little fruit trees.

Prior to achieving a virtually pest-free garden, I had changed my spraying practices considerably. It never seemed wise to me to have the leaves of bushes covered thick with "gook." Since the leaves and foliage of plants are not only the factory producing the plant's growth and bloom but likewise its breathing apparatus, clogging up of plant pores and breathing apparatus never made much sense. On top of this, uncoated leaves are lovely green, often shiny bits of garden beauty, something they are decidedly not when gray and lifeless. Likewise, it always seemed a shame to me to ruin the bloooms which I tried so hard to produce. As a consequence, it became my practice to try to anticipate rains rather than spraying on any regular schedule or *after* a rain. If a really good sticker-spreader is used with a spray, the material is effective even if apparently washed away. Actually, no spray nor dust will cure a disease; it merely protects against it. Thus, spraying or dusting after a rain may have some effect by stopping the spread of infection, but its real use is to protect against the *next* rain which may be days or even weeks away, a silly practice it seems to me.

Two old garden practices which I received from my grandmother I have begun to practice again. Long ago she preached to me, "Plant roses as they grow in the field." This I do, which puts the graft-bud about at the surface of the mulch. This prevents rooting above the graft and makes suckers from the understock no problem. For me, roses have responded favorably to this treatment.

The other practice is one generally followed in England and by many careful rose growers in this country—this is the removal and replacement of soil when replanting a bed. I have a pile of fresh clay in which nothing has been grown. With this I mix humus—two of old cow manure to one of peat moss. In the bottom of the hole I use another old-fashioned practice; I put in six inches of straight cow manure and a cup of superphosphate. The removal of the old soil provides fresh new strength I have found, and I *hope* it at least checks infection and nematodes.

This spring my garden is the source of considerable embarrassment. When people ask what spray I use and I say "none," I get a highly sceptical look and occasionally a remark, "Well, if you want to keep it a secret . . ." Nevertheless, the foliage has never been so big and shiny, the buds more plentiful nor the floriferousness greater. It has *really* worked.

Outdoor Chrysanthemum Culture

By **Spencer Harrison Capreal**

continued from March-April

OVERHEAD PLANT PROTECTION

THE PRACTICE OF protecting plants against frost and cold weather is not new. The outdoor gardener has tried many ways of keeping flowers and vegetables growing as long as possible through the fall months.

As I look back over the years, I remember Grandma and Mother, too, smelling the air for frost on September evenings (Massachusetts). Those were the days when weather predictions were neither too reliable, nor readily available. Grandma seemed to have an uncanny sense when frost was on its way. Newspapers, burlap and old sheets were put over the plants and were taken off in the mornings. Sometimes when predictions missed and a little frost appeared in the morning, the hose was turned on the plants to wash frost off before the sun hit them. When the frost was a little heavy, it was noticed that flowers or vegetables were really frost bitten where they touched the covers, but the vegetation below was still good. To prevent covers from lying directly on the plants, stakes were made to extend about a foot above them. It made an odd-looking picture but it did save a few late peppers, tomatoes and flowers. Other neighbors did likewise, and Mrs. "Cap" still uses this method on isolated plants.

Times have changed since those days and research has given us methods for better plant protection from early spring until late fall.

All of us have had a favorite variety ruined by frost just when it was coming into full bloom. One of the saddest sights we ever saw was in October, 1949, when we stopped at Bristol, Connecticut, to say "hello" to the late Alex Cummings and to view his beautiful display. We found a very distraught Mr. Cummings. Two nights earlier a hard frost had blackened several acres of outdoor chrysanthemums — large commercial growers have their problems, too. That is why they are always looking for an economical covering to protect their plants, not only against frost, but all summer long to keep out disease-carrying insects and to prevent water from spattering on the leaves. Weeds, too, can be kept under control. A partial solution to this, of course, is to start with properly sterilized soil.

Probably the first economical structure for plant protection that attained some popularity was the cloth house. Following the experiments conducted by the late Dr. Kenneth Post (1930-33) with an aster cloth house, a number of these cloth houses were put up by commercial growers in the 1930's and 1940's. Credit for the first cloth house for plants around the early part of this century is given to a Japanese grower in southern California.

However, aster cloth, being an open mesh, allows rainwater to drip on the large chrysanthemum disbuds and causes the petals to rot. The pompons are less affected. Temperature is not too much of a problem, as most of these growers force their flowers into bloom before the middle of October. In the coastal areas of California, especially the central part where temperature and rain is of no great concern, a number of cloth houses (aster and saran) are still used to grow chrysanthemums. Some of these houses cover several acres or more of ground.

Everyone recognizes the efficiency of glasshouses, with their heating and ventilating systems and now the newer cooling methods, but such houses are quite expensive to erect. So the search for something better than cloth but cheaper than glass, was intensified. By the early 1950's there was quite a bit of discussion about plastics—how reasonable could a plastic greenhouse be built? Could it be used throughout the winter with the addition of a little heat? It wasn't long before a number of different construction recommendations were made, but the trials on the lasting qualities of these plastic houses were not very encouraging.

Polyethylene (Du Pont) was probably the first of the plastics to be tried out by quite a number of growers and experiment stations. It was found that summer heat and the sun's ultraviolet rays caused a breaking down of this material. Nevertheless some growers felt that polyethylene was cheap enough to use it for recovering each season. Following polyethylene, a clear glass-like plastic (Polyflex 2, a styrene acrylonitrite) came on the market, which appeared to be more promising, but this, too, broke down in the second season. A new plastic, weatherable "Mylar," a polyester film (Du Pont) is being released in commerce this spring after nearly two years of tests, outside and in the laboratory.

There is a vast difference in durability between weatherable "Mylar" and Du Pont's regular "Mylar." Evidently the molecular structure of regular "Mylar" has been changed to create a far more durable, weatherable "Mylar." In tests under ultraviolet sun lamps at 130° F., samples of 5 mil. weatherable "Mylar" are still tough and clear after forty-nine weeks; these tests are being carried to completion. Under these same conditions, regular "Mylar" degraded within two hundred hours.

Two test greenhouses, covered with weatherable "Mylar," were put up by Du Pont—one in Florida and one near Wilmington, Delaware. The Florida house was in very good condition more than a year later; the Wilmington house, twenty-two months later, was also holding up well. At present (spring 1958) Du Pont's pilot plant is making available weatherable "Mylar" in thirty-six inch to forty-inch widths. When production is transferred to their Circleville, Ohio, plant, widths of fifty-five inches will be available.

From the tests made with weatherable "Mylar," a five-year plastic house may be a reasonable expectation for our northeastern states.

Construction details for a plastic greenhouse will vary with the width of the plastic or the means used to support it; but, in general, the same principles may be employed as in the construction of a simple garage or a shed with a

peaked roof (studs and rafters). Any wood surface placed in the ground, resting thereon, or resting on any foundation where it will be subject to dampness should, however, be protected by a wood preservative. In building construction, studs and rafters are generally spaced sixteen inches on center; but for a plastic house, the spacing of the studs and rafters (in greenhouse construction, they are called roof bars and side bars) can and does vary, depending on the width of the plastic. Suggestions for bar spacing has been from twenty-inch to thirty-six inches; Du Pont's test house (covered with weatherable "Mylar") has bar spacing, twenty-four inches on top and thirty-six inches on the sides. The important point in spacing bars is to allow ample room for the sides to lap over so wood strips can be nailed over them. A twenty-inch bar spacing would be ideal for a twenty-two inch or forty-two inch wide plastic and a bar spacing of twenty-seven inches will probably be practical for a plastic fifty-six inches wide. For those who wish to use polyethylene, and do not mind recovering each season, widths of from three to thirty-two feet and up to two hundred feet long can be purchased. The advantage of wide and long polyethylene is that bar spacing can be six to eight feet apart, provided some sort of supporting wire cloth is put on first. Whatever the construction may be, reinforcing against wind is advisable. Where the width of the plastic house is ten feet or more, the eaves and rafters should be tied across with #4 or #6 wire on a toggle bolt, to keep the sides from spreading and the roof rafters steady.

In planning a structure, it would be well to allow a path from two to three feet around the flower beds, especially if black cloth is used for forcing earlier blooms.

Ventilating a Plastic House

Especially, through hot summer days, ventilation is important. Sashes that can be opened and closed may be placed on both sides of the ridge. It is probably better for a small house to have a pretty good opening at both ends below the ridge, screened on the inside (to keep insects out) and a sash covered with plastic hinged at the top that can be pushed out. With this end ventilation, a suitable fan, placed on a shelf inside, can change the air quickly. Or, if one can afford a cooler, Lord and Burnham Co. has three cooling units on the wet pad and fan system that will cool from two hundred and twenty-five to five hundred square feet of ground area.

Those who wish to start their growing early, or to continue into November, can also have heat. For a small plastic house, one or two electric fan heaters will be sufficient. As the house gets larger, there are a number of economically operated heating units that can be used. One of these brands, "Knipco" (division, Knickerbocker Products Co., Dayton 1, Ohio) is a portable heating unit. They are rated to produce from 50,000 to 400,000 BTU's per hour. There are four of these units, and the smaller one "Thrifty 50," will probably provide ample heat for a house with four hundred square feet of ground area. The larger units will heat proportionally greater areas. These "Knipco" heaters are operated with a motor and fan, with kerosene, or No. 1 fuel oil. Turning the switch on opens and ignites the fuel. The fuel outlet closes in case of power or motor failure. Asbestos ducts are recommended for the larger units; they can be attached and placed around the house for more uniform heating.

Lord and Burnham Co. has a gas heater (natural or bottle) for small greenhouses, or a plastic house, which is very efficient and should be ample to heat about five hundred square feet of ground area. This unit is not portable, but can be installed quite easily. It is built for automatic operation and must be provided with a thermostat for temperature control. There are two powerful blower fans that emit 460 CFM of air for uniform heat distribution.

The reader has, no doubt, observed our references to commercial growers. It may be well to point out that whether it is farm crops, trees and shrubs, or flowers, these growers are the ones who take advantage of facts developed through research and create a demand for effective chemicals, fertilizers, equipment, cloth or plastic houses, for the production of better flowers in greater quantities does result in more profit. This greater commercial demand makes it possible for the manufacturer to make available to the home gardener smaller quantities at reasonable prices.

Let me mention a few of the things that we have done for frost protection. Having followed the experiments of the late Dr. Kenneth Post with an aster cloth house, we were quite aware of its porosity and dubious about its frost protection during the last half of October, when a black frost could be expected. We noted that most of these earlier aster cloth houses were used for florists' crops which bloomed before the middle of October. Forcing of chrysanthemums was still in an early stage.

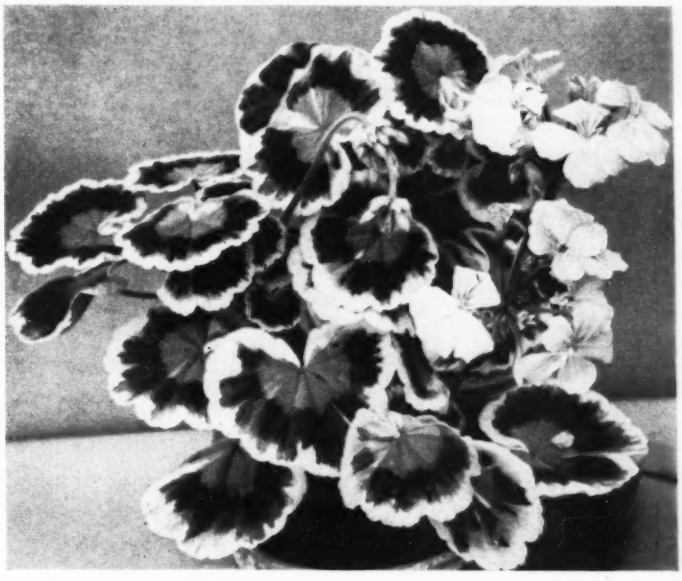
In 1940, when we wanted to do something about frost protection, we decided to use eight-ounce white duck. We constructed a frame five feet by thirty-six feet, the long way facing north and south, with two by three-inch wood posts spaced nine feet apart. The south side was five feet six inches high and the north side five feet high. A one-by-four inch board was bolted to the sides, even with the top. One-by-three inch boards were fastened to the top of the posts to keep the frame steady. Several rows of hemp twine (binder-twine) criss-crossed over the top and one line was tied on the sides to keep the duck in place. We found out later that a wire cloth of some kind would have been better under the duck. The duck was sewed to width five feet six inches and cut to length, and grommets were run at two-foot intervals around the edges. The ends, top and north side were tied to the frame through the grommets. The south side was tied at the top only and raised up during day time and covered at night. This duck cover was put on shortly after Labor Day and left on until the latter part of October. The plants did surprisingly well. It was encouraging

(Continued on page 134)

Geraniums

MINIATURE, FANCY and IVY-LEAVED

By Walter Singer



Upper left.
Geranium
'Skies of Italy'

Upper right.
Geranium
'Mrs. Parker'

Right.
Geranium 'Velma'

DO YOU REMEMBER how a good many years ago almost every house in the country or city had some kind of geranium on the window sill — or perhaps that was before your time? For a long while, geraniums disappeared from the home and were used mostly for outdoor planting.

In recent years, however, the popularity of geraniums in the home has reached another high, and two types in particular are "red hot" items on the plant market today. They are the fancy-leaved and the miniature or dwarf geraniums. Both types have become so popular and newsworthy that they have caused a great to-do in the international geranium and pelargonium society; it looks as if the members will have to get together in order to reclassify them.

Most of the varieties have become known either for their colorful and oddly-shaped foliage or for their dwarf habit—some miniature geraniums do not exceed six to eight inches in height. Extensive hybridizing in the field of fancy-leaved and miniature geraniums has been done in southern California. Of course, on the West Coast, the climate is a natural for such work and enables the growers to work with geraniums during the entire year, while here in the East we are more or less restricted by our long winters. Names such as Holmes Miller, Ernest Rober, David Case and Paul Jackson are well known as hybridizers of geraniums in California. Here in the East Milton Arndt of Hightstown, New Jersey, has introduced new geraniums such as the Carlton Dwarfs. Space does not permit naming all who have worked intensively on the new geranium hybrids, and it would also be too lengthy to mention in this article every single one of the new and old hybrids among fancy-leaved and miniature geraniums.

If we take upon ourselves the task of classifying them without following strict botanical or horticultural terminology and think of just the way they look to us, we shall find the following groups: 1) the tricolor geraniums, 2) the variegated—green and white geraniums, 3) the bronze and gold varieties, 4) the dwarf or miniature geraniums, and 5) the fancy-leaved ivy geraniums.

The tricolor group is outstanding for the brilliant, colorful foliage its members possess. We should not care if they never bloomed so glorious is their

leaf coloring, yet some of them have very attractive flowers and blossom freely in the bright sun. One of the most beautiful of the tricolor group is 'Velma;' the leaves are bright green in the center with a reddish brown zone splashed with crimson and scarlet and pink. The margin is slightly scalloped and golden-yellow to creamy in color. This variety grows bushy and rather small; its flowers are single and light salmon. Mr. Arndt has brought out a very fine strain of 'Velma' which he calls 'Carlton Velma.'

In this same group we find similar varieties such as 'Miss Burdett Coutts.' Its distinction is the silvery hue over the foliage. The leaves have a grayish green center zoned by a deep brown wide circle with a creamy white margin. The flowers of this variety are single and scarlet.

'Maximilian,' a variety introduced from Mexico, has irregularly lobed leaves that have a bright green center with a creamy white border. A brown zone is splashed with crimson and scarlet. The flowers are double and range from orange to salmon.

'Mrs. Cox' is a hybrid introduced from England. The velvety green leaves have a zone of reddish brown splashed with scarlet and crimson; the flowers are salmon-colored, rather small and single. Very beautiful and quite different in the shape of the leaves is the tricolor variety, 'Skies of Italy.' Its leaves resemble those of a maple tree in shape, having pointed lobes. 'Skies of Italy' has a very intense reddish brown zone splashed with scarlet and crimson. Its flowers are single and brilliant scarlet.

In the variegated green and white-leaved group some of the old-timers still dominate the field. Since these old-timers are making such a spectacular comeback, they may intrigue the newcomer to the tribe of fancy-leaved geranium collectors as being new introductions. 'Mrs. Parker,' originally from England, was introduced into the United States around the turn of the century. Its quilted leaves are rather thin and gleaming green. The white border widens at irregular intervals. Though the flowers are small and semi-double, they stand out well above the luscious foliage because of their rose-pink color. We can not omit the very famous French variety, 'Mme. Salleron,' which for many years was the standard border plant for formal bedding. Quite unique are the very long and thin-stemmed leaves bordered in ivory-white and of very thin texture.

A variety recently mentioned quite often among dwarf geranium growers is 'Kleiner Liebling' (Little Darling). The leaves are gray-green with a white border; the flowers are single, large, and of bright rose-pink.

On the border line between the tricolor and the variegated (white-green) geraniums is a variety, named 'Happy Thought,' which has gained great popularity in recent years. The leaves are bright green and have a large yellow

Geranium 'Bronze Beauty'

center which resembles a butterfly in shape. No wonder it's sometimes called the "butterfly" geranium. The leaves of 'Happy Thought' are sometimes faintly zoned with splashes of brown. The flowers are soft vermilion-red and single. There is also a pink 'Happy Thought' with rose-pink flowers.

The next group is the golden and bronze-leaved geraniums, obviously known for their bronze or gold-colored leaves. You'll find varieties like 'Golden Treasure,' 'Cloth of Gold' and 'Bronze Beauty.' In general, these varieties have medium-sized to large leaves, but their growing habit is compact, bushy, and small to medium. 'Bronze Beauty,' for instance, has large yellowish green leaves with a reddish bronze horse-shoe zone. The flowers are single and of a glowing salmon-pink.

Of course, the talk of the town today are the miniature geraniums. The plants are extremely interesting because of their dwarf growing habit and their outstanding brilliant flowers. Maybe the mother of them all is 'Black Vesuvius,' an old English variety which dates back to the nineteenth century. A fully matured plant never grows taller than eight to nine inches. Though it is a very small plant, it has large flowers which are single and of orange-scarlet color. They shine brilliantly above the small dark (black) green leaves.

Another miniature of great fame is 'Pigmy;' its small leaves are light green, and the flowers small, double, and red. 'Imp,' a recent introduction by Miller of California, has very attractive large salmon-pink flowers which stand out in brilliant contrast to the dark foliage inherited from 'Black Vesuvius.' Among other dwarf varieties from California are the ones named after the Disney characters: 'Dopey,' which has pink flowers with a white throat; 'Sneezy,' red flowers with a white throat; 'Fairy Princess,' light salmon flowers with darker center.

We should not overlook two varieties on the borderline of dwarf geraniums, whose habit varies with the culture applied to them. If not fertilized and watered as much as we would normally do with other varieties, 'Distinction' and 'Mme. Fournier' will stay quite dwarf. 'Mme. Fournier,' which came from France, has since been parent to many new miniature hybrids. Its small leaves are very dark green, almost a purplish black with a darker zone; its flowers are small, single, and scarlet. 'Distinction' has all its name implies as far as the foliage is concerned. The round leaves have a ruffled, coarsely toothed edge and a very distinct zone close to the margin. This zone will vary from a brownish purple to a lighter reddish brown depending on light conditions. The single flowers are red.

One group of geraniums, which may not claim as many members as the zonals, has come to life again with some rather new creations. They are the ivy-leaved (no, not ivy-league) geraniums, originating from *Pelargonium peltatum*. If you have visited southern California, you have seen the colorful mats—groundcovers or walls draped with ivy-geraniums, named for their ivy-shaped leaves and their vine-like growth. Most of these ivy-geraniums

Taking a cutting of a strong shoot

Removing leaves and stipules from lower two inches

Inserting the cuttings in sharp sand

are good house plants, especially suitable for baskets which are very attractive when hung in a sunny window.

A real fancy-leaved ivy-geranium is 'L'Elegante,' an old French introduction which has come out lately under different trade names, such as 'Madame Margo,' 'Barometer,' 'Sunset.' There may be slight differences, but they all seem to boil down to the characteristics of 'L'Elegante.' Their leaves have creamy edges; growing in full sun and a little cooler than other geraniums, the shield-shaped leaves will be hued with an attractive magenta-pink. This color change will be helped if this variety is kept on the dry side—given less water. Also, if the shoots are pinched occasionally, 'L'Elegante' will stay compact. The flowers vary from white tinged with lilac to pink.

California has created some excellent ivy-geraniums such as 'Sybil Holmes,' 'The Duchess' and 'Snowdrift,' white; 'Catalina' rose-pink; 'Enchantress,' light pink with rose stripes in the throat; 'Lavender Gem,' a double-flowered ivy-geranium.

Geraniums can be started from cuttings at any time of the year, provided strong and healthy propagating material is available. That time is usually in July, August, and September when geraniums are mostly outdoors either in beds, terraces or window boxes. Make tip cuttings three to four inches long of healthy, strong shoots. On the lower two inches take off leaves and stipules. It is advisable, but not absolutely necessary to let the cuttings lie around for a couple of days in an airy and shaded place. The cut will dry and start to build callus; this healing period also prevents stem rot. Before putting the cuttings into sharp sand, dip the cut into a rooting hormone; this speeds up the rooting process. Keep the sand moist but not wet. During the rooting process the cuttings should be shaded without too much air circulation, yet enough air to prevent high humidity and condensation (both causes for stem rot).

Rooted cuttings are potted into a sandy soil mixture—two parts of soil, one part of sand and one half part of leafmold — in two-and-a-quarter-inch pots. The young plants will stay in these pots until February or March when they should be shifted into three- or four-inch pots. Most miniature and fancy-leaved geraniums are not very vigorous growers and do not need large-sized pots. The soil mixture for the three or four-inch pots should be more nutritious than it was for the rooted cuttings.

During the days of my apprenticeship we rooted geranium cuttings individually in two-or two-and-a-quarter-inch pots quite successfully. This short cut saved the extra work of rooting the cuttings in sand and potting them thereafter. It also gave the rooted cuttings an early start in the soil mixture which, though a light one, still furnished more food than sterile sand.

A geranium soil mixture should have the following ingredients: three parts soil, one of manure, one of leafmold, one-half of sand; and one four-inch pot of bonemeal to each bushel of the soil mixture.

In potting geraniums make sure of good drainage at the bottom of the flower pot; this will, to a great extent, prevent damage from overwatering. Geraniums should be potted firmly, but the soil should not be pounded with a potting stick. Do not overpot geraniums; they like being a little pot-bound and bloom freely that way.

To obtain bushy plants geraniums should be pinched (nipped) at intervals. This is best done when the plants, two to three weeks after a shift, start fresh growth again. Pinch the heart (tip) out of the end of a shoot above three to four well-matured leaves. When you want the geraniums to put on a lot of growth, pinch out flower buds which take away from the strength of the plant, but stop this removal five to six weeks before the desired flowering time.

Geraniums, originally natives of South Africa, like heat especially in their juvenile growing stage. At that time, night temperatures should be not lower than 55° to 60° F., with day temperatures about 10° to 15° higher. During the late fall and winter when geraniums are usually rested, temperatures may go as low as 45° F. With these low temperatures watering should be less than at higher temperatures—just enough to prevent wilt. Geraniums should never be overwatered; they prefer being on the dry side. Never water geraniums when the soil is still moist.

Sun is most essential for geraniums, the more the better. A window with southern exposure is most favorable.

If there is an opportunity to plunge geraniums outside or even plant them in the garden during the summer, so much the better. In the fall, before night frosts, they should be lifted and pruned back (about one-third to one-half) and potted into flower pots just big enough to hold the root system. The roots also can be cut back slightly. Add one-half part of sand to the regular geranium soil mixture for better drainage at this time.

By the way, you may be the next originator of new fancy-leaved or miniature geraniums. Not only are there seeds available in the trade, but you can easily harvest your own crop if you are careful in pollinating. It takes only seven to eight months after you sow seeds to see results. You'll never know until you try.

SPRING GARDEN TOUR

Photographed by **T. H. Everett**

Wet weather — a steady drizzle broken at least once during the day by a downpour — failed to dampen the ardor of those who participated in the 1958 Spring Garden Tour sponsored by the Volunteer Associates of The New York Botanical Garden. Everyone fully appreciated the opportunity of visiting the six gardens, each one very lovely, very distinctive.

"The Studio," the home of one of America's leading landscape architects, Umberto Innocenti, and Mrs. Innocenti, occupies less than four acres and is a triumph of design. The broad lawn is set off by marginal plantings of trees and shrubs, both evergreen and deciduous, and accented by flowering shrubs and perennials. The attractive terrace is an ideal place from which to view the panorama of the four seasons.

"Windermere" is situated close to the water on the north shore of Long Island at Bayville. In 1945 Nathaniel Norris and the late Mrs. Norris began a "do-it-yourself" program, restoring the grounds and furnishing the small compact house designed by Bradley Delahanty and built in 1925.

A knot garden, a rose garden and flower walk, an enclosed garden with espaliered apple and pear trees on the walls, clipped hedges, and a beautiful sloping lawn are among the attractions of "Bogheid," the estate of Mrs. Paul Pryibil, Locust Valley. The Georgian brick house, designed by William Adams Delano, commands a magnificent view of Long Island Sound.

"Peacock Point," the estate of Mrs. Henry P. Davison at Locust Valley, is planted for a succession of bloom from early spring to fall. There are two large formal gardens with splendid specimens of Japanese yews and box, extensive lawns, large orchard and vegetable garden, and a greenhouse in which lilies, carnations, roses, and red and white poinsettias are featured. Situated at the water's edge, the house has an impressive view of Long Island Sound.

The terraced lawn from which there is a fine view of Long Island Sound is indeed a charming feature of "Rattling Spring," the estate of Mr. and Mrs. Francis E. Powell at Glen Cove, Long Island. Of special interest are the espaliered fruit trees in the spring garden, a beautiful formal garden, and a small rock garden. Orchids and carnations are feature crops grown in the large greenhouses. The traditional house, built of natural field and quarried stone from Pennsylvania, was designed by Richard Kimball.

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Upper Right. *Ilex crenata convexa* is espaliered on the brick wall. This method of training plants is a specialty of Mr. Innocenti. There are many fine examples of espaliered yews throughout his garden.

Lower Right. Four-armed cordon pear trees decorate the kitchen wing of "The Studio."

Below. This expanse of lawn, viewed from the wide windows of "The Studio," the home of Mr. and Mrs. Umberto Innocenti at Greenvale, Long Island, is mowed to give this striped appearance. This is done in many European gardens.

Apple and pear trees are neatly espaliered against the walls of the enclosed garden at "Bogheid," the estate of Mrs. Paul Pryibil at Locust Valley, Long Island. *Alyssum saxatile* and primroses grow in the planted stone wall, while a mat-forming *Sedum* thrives at its base.

Apple trees have been espaliered to form an arbor in the center of a flower garden at "Bogheid." The arbor is seventeen or eighteen years old.

The old-fashioned knot garden of boxwood is another beautiful feature of "Bogheid," and seldom seen today.

Right. Mr. Nathaniel Norris greets visitors at the front door of his charming home, "Windermere" at Bayville, Long Island.

Lower Left. *Phlox subulata* and other low-growing plants are effectively used between the paving of the terrace on the Long Island side of the house. Here, too, is a fine old wind-blown dogwood.

Lower Right. The trees in the small apple orchard, carefully pruned, must endure the strong winds prevailing at "Windermere."

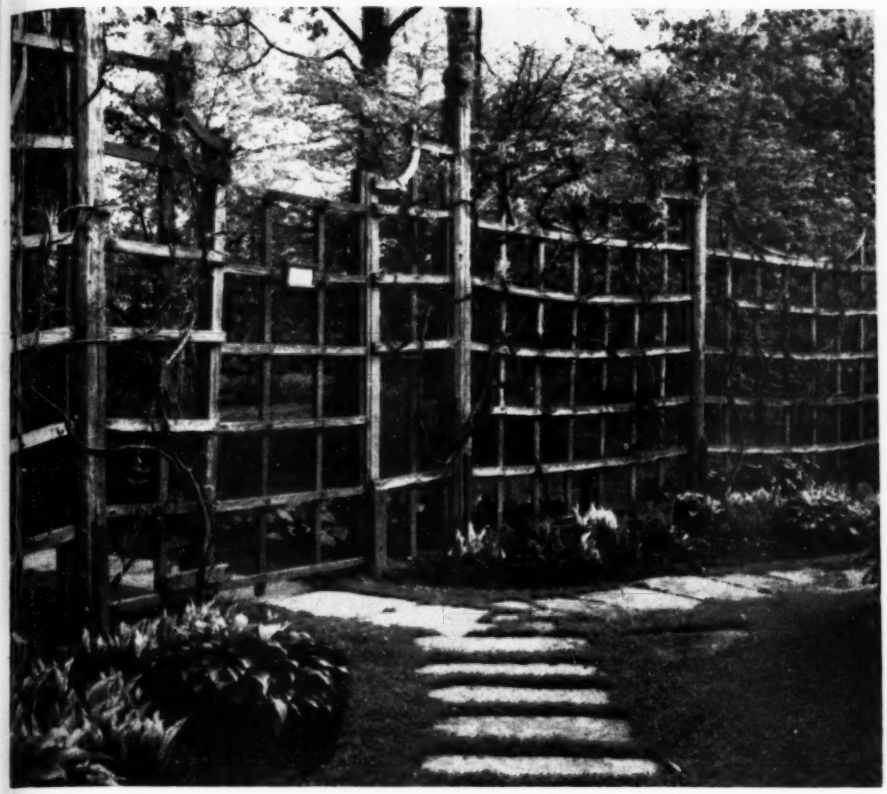
Above. A beautiful pink dogwood with a fine specimen of English boxwood nearby, stands at the side of the guest house at "Florolyn," the estate of Mr. and Mrs. Edmund C. Lynch of Locust Valley, Long Island.

Upper Right. An attractively landscaped corner, with dogwood and rhododendron predominating, by the pool house at "Florolyn." On the wall of the house pyracantha has been espaliered.

Lower Right. The beds of pansies, extending as panels through the cottage garden, are edged with *Veronica incana*, a gray-leaved plant that bears low spikes of blue flowers in early summer. Some of the borders toward the lower section of the cottage garden were edged with *Brunnera macrophylla*, a hardy perennial that prefers moist soil and stands partial shade. This forget-me-not-like plant was recognized by some of the visitors to "Florolyn" by its former name, *Anchusa myosotidiflora*.

Left. Wisteria has been trained over the charming thatched summer house in this formal perennial garden at "Peacock Point," the estate of Mrs. Henry P. Davison of Locust Valley, Long Island. Many tulips were blooming in this garden on the day of the Spring Garden Tour.

Below. Virginia bluebells, *Mertensia virginica*, and trilliums, hardy native perennials that like shade and rich moist soil, flourish at "Peacock Point." This is an especially fine clump of *Trillium grandiflorum*.



This attractive trellis marks the transition from the formal gardens at "Peacock Point" to the more informally planted area.

A beautiful formal garden, planted with spring-flowering perennials and tulips, is located at one side of the residence of Mr. and Mrs. Francis E. Powell, "Rattling Spring" at Glen Cove, Long Island. An unusual shrub that attracted considerable attention was *Daphne Genkwa*, planted near the head of the steps leading down into the rock garden.

Pansies and daffodils give a pretty spring touch to the foreground of this shrub border at "Rattling Springs."

Beyond and below this heavily flowered *Malus atrosanguinea* near the boundary fence of "Rattling Spring" is Long Island Sound.

CHRYSANTHEMUMS (from page 126)

but not ideal. It did repel the water and was of considerable value against frost. Several years later, when we had a snow storm around the middle of October, the value of the white duck cover increased immensely. I speak of snow because even a warm snow on the blooms will do more harm than a heavy frost.

We had a heterogeneous layout of flower beds. We kept adding new beds as we fell in love with more and more varieties. We felt that we must rotate the plantings since soil sterilizing materials in those days were not too efficient, and steam was out of the question. Learning about the successful tests with chloropicrin at the Rhode Island Station, we decided to put up more frames. They were built six feet high of differing widths, with a peaked roof. They were made a little wider to hold a simple pipe arrangement for the wire plant supports and to hold the black cloth. This pipe arrangement for black cloth and plant support can be used even without a protective frame over it. In fact, more recently, we changed this pipe arrangement for black cloth into a protective frame by attaching one-inch by four-inch boards to the top and sides with pipe straps. Fifty-six inch polyethylene was stretched across the top and nailed to the boards with lath strips. We attached open screw eyes to the board, about three feet apart, ran an eight-gauge wire through six-foot florists' aster cloth, and enclosed the whole thing. When we needed to spray the plants, we just released the wire (which had been securely fastened at each end) through the middle portion of the beds, drew the cloth back enough to make sure our sprayer hose would reach all parts of the bed, and when finished pulled the cloth back together again, and put the wire back over the screw eyes. The nice part about a pipe frame is that it can be taken apart and moved to another location.

When we decided to test polyethylene (1954-1955) the problem was how to attach it to our old frames with the posts and rafters eight feet apart. By nailing two by four-inch twelve-gauge wire cloth over the top of frames, we were able to put the plastic over it firmly, but the sides were another question. The width of the frames was not wide enough to walk around in, if we put wire on the sides too, so we fell back to using aster cloth and white duck again. We were probably fortunate in not rushing to build a new structure for plastic until more was known about it. Now we feel that tests have been going on long enough with weatherable "Mylar," to warrant a new structure to cover all our chrysanthemum plants. We hope, by the summer of 1958, we shall be able to purchase "Mylar" wide enough for economical spacing.

Heating, too, has become a problem since our frames, when covered, are never air tight. Spot heaters—those which burn oil or kerosene, but no fan, are too hot placed close by; and at a safe distance, the enclosure cools off too quickly. We have tried electric light bulbs (15 watts) spaced a foot apart and strung up inside of the covers just above plants. Heating cables (chromalox type) were used also with aluminum reflectors. Both the electric lights and heating cables should be quite efficient in an air-tight house; the cost of operation will be the main concern. Both of these methods can be recommended but it would be well to mention one point: flower buds that are tight and showing no color will be delayed in their bloom.

LAWN (from page 115)

New lawns need lime, phosphorus, potash and nitrogen. According to recent developments at the University of Rhode Island, work done by Dr. De France and his associates indicates that solid Urea-form and Urea-form-based fertilizers, incorporated in the seedbed before sowing the seed, is one of the safest, surest ways of developing a turf in the shortest possible time, with the least trouble from weeds. Many old lawns need principally nitrogen. Many of them have been "5-10-5'd to death." In many of our lawn soils there is enough phosphorus and potash to last for years to come; therefore, yearly applications of a straight solid Urea-form at twenty pounds to one thousand square feet will produce better turf than has been experienced in the past with conventional fertilizers.

We have been discussing fertilization and nothing has been said about topsoil. In the past, most recommendations for building a new lawn start with these words, "Bring in six inches of rich topsoil." Those days are gone forever. Today we must build a lawn on what we have, and it will serve just as well anyway. This can be done with adequate fertilization with the right kind of fertilizer and with adapted grasses; grasses that are adapted not only to the soil and to the climate, but also to the use to which they will be subjected and to the management which they will receive.

A superior fertilizer can produce superior results only when used in connection with an adapted grass. Most of our ordinary grasses have failed to produce the desired results because their susceptibility to disease has permitted them to become thin, open, and invaded by weeds. Under conditions of heavy disease infections, these grasses cannot effectively utilize the available supplies of plant food. In many cases, diseases shorten the root systems which cause the grasses to suffer severely from drought. The improved grasses are better primarily because they are more resistant to the most serious turfgrass diseases, they are deeper rooted, more drought resistant, and will tolerate closer mowing. Here are some of the improved grasses adapted to the Middle Atlantic Region:

MERION BLUEGRASS is being used in the cooler and the mountainous parts of the region to supplement or to replace common Kentucky bluegrass. It is much more resistant to leafspot, which so often damages common Kentucky bluegrass turf in the spring opening it to crabgrass invasion. Merion, when properly nourished, has a deeper color, tolerates closer mowing, utilizes fertilizer more effectively and, as a result, produces a turf that is more free from weeds. Merion produces a dense, firm cushion of turf and very nearly meets the requirement of being green the year round. It demands a higher fertility level than common Kentucky bluegrass and responds well to the heav-

Here's another little chart showing pounds of "Blue Chip" fertilizer to supply six pounds of nitrogen:

8-6-2	75 pounds	12-6-6	50 pounds
10-5-5	60 pounds	14-7-7	44 pounds
10-6-4	60 pounds	20-6-4	30 pounds
10-3-7	60 pounds		

ier nitrogen feeding. Height of mowing should be seldom over one inch. Clippings should be removed to eliminate possible infection of rust, which frequently damages Merion in the late summer if it stops growing for ten days because of drought or starvation. If Merion is maintained in good growth with adequate feeding and water when needed, rust ceases to be a problem. Merion is not well adapted in the coastal plain areas. It is a favorite on athletic fields, golf course tees, on many fairways and on lawns in the area of adaptation.

PENNLAWN CREEPING RED FESCUE is an improved fescue which fits precisely into the same pattern as Merion bluegrass. It grows over the same territory as Merion bluegrass and is an admirable companion to Merion. A mixture of sixty to seventy percent Pennlawn creeping red fescue and thirty to forty percent Merion bluegrass will produce a turf that is second to none. Pennlawn is characterized by its deep green color. It is highly drought resistant, tolerates close mowing, and is more disease resistant than ordinary red fescues. It is an excellent shade grass, especially where it is dry shade.

KENTUCKY 31 FESCUE—Kentucky 31 fescue is rather broad-bladed and, for this reason, many people shun it. It has been downgraded because some cheap lawn mixtures contain a small percentage of Kentucky 31 fescue. This results in scattered plants which become ugly, coarse and clumpy. This characteristic completely disappears when Kentucky 31 fescue is seeded heavily from five to seven pounds to one thousand square feet, when it is fed adequately, and when it is mowed at a height of one and one-half to two inches. There are lawns of Kentucky 31 fescue that meet nearly every requirement, including that of being green the year around. Kentucky 31 fescue will grow in any type of soil, in shade or sun, in wet soils or dry, and is highly resistant to diseases and insects. It is a favorite for athletic field seedings, usually in conjunction with bluegrass. Where the fertility level will be high, Kentucky 31 may be blended with Merion bluegrass. Where the maintenance level will be a little lower, Kentucky 31, Merion and Pennlawn fescue all may be combined. In general, Kentucky 31 deserves to be used first on the larger lawn areas such as parks, industrial lawns around factories, in golf course roughs, on highways and similar locations. It is not the kind of grass that one would choose to plant on a small lawn of only a few thousand square feet.

IMPROVED BERMUDA GRASSES. Among the improved Bermuda grasses in the Middle Atlantic Region, U-3 stands out as being used the most widely. It is very cold tolerant, forms a dense medium-textured turf of high quality and is very tolerant of drought. During 1957, when many areas were severely hit by drought the only green turf (unwatered) was U-3 Bermuda grass. U-3 is planted by sprigs or plugs or stolons or can be sodded. It is popular on golf course tees and is being used more widely on fairways. Many lawns have been planted to U-3 Bermuda. Its chief objection on a lawn is its vigor and ability to grow into flower beds and shrub borders, where it is not particularly appreciated. It stands very close mowing and maintains a beautiful green color throughout the hottest weather, but is quite brown during the winter. U-3 is not in general use in the cooler parts of the region.

SUNTURF is another improved Bermuda that fits into the same category as U-3, has a little darker green color, is a little finer, and is being preferred for some lawn areas, particularly in the southern part, the warmer part of the region.

UGANDA GRASS is a very fine-bladed type of Bermuda which is not being recommended for general lawns, but is one of the best for special areas, such as private putting greens, bowling greens, tennis courts, badminton courts, and other special hard-wear play areas in open sunny lawns. It will grow almost anywhere in the Middle Atlantic Region except at the higher elevations. It demands high nitrogen fertilization as do all of the Bermudas. The brown color in the winter can be softened by overseeding with some cool-season grass such as redtop, red fescue or Kentucky bluegrass, or the turf can be colored with a green pigment.

ZOYSIA GRASSES. Among the zoysias are Meyer, Matrella, Emerald, common and many good unidentified strains. Zoysias prefer the open sun, as do the Bermudas, but they will tolerate light shade, which the Bermudas will not. The zoysias do not require as much nitrogen as do the Bermudas. They will grow in any soil but are somewhat less drought tolerant. They are much easier to control in borders and flower beds. They turn a more golden tan, whereas the Bermudas turn a rather dull grey in the winter. Among the different types of zoysia, Meyer is far and away the most popular in the Middle Atlantic Region. Meyer is not recommended for the mountainous areas and the higher elevations. It should be used only where it becomes difficult to grow the improved cool season grasses.

KENTUCKY BLUEGRASS—Many lawns of Kentucky bluegrass are being improved through more adequate feeding with the controlled-release fertilizers. In some cases where even this does not bring the quality desired, they are being overseeded with Merion and Pennlawn creeping red fescue, or they are being plugged or sprigged with the warm season grasses. One of the greatest enemies of Kentucky bluegrass lawns is leafspot which hits in the spring and damages the turf just about the time crabgrass is starting to germinate.

In establishing new lawns, this is about the way the old conventional recommendations read: "Superphosphate or 0-20-20, forty pounds to one thousand square feet. 10-10-10 fertilizer ten pounds to one thousand square feet. Seed five pounds to one thousand feet and mulch, one bale to two thousand square feet." This gives one pound of quickly available nitrogen to one thousand square feet to start the grass. This will last about three weeks. If additional nitrogen is not supplied at that time, the turf becomes starved and weeds take over.

Here is a new recommendation for starting a new lawn, using a "Blue Chip" 10-5-5 fertilizer or similar: "10-5-5 'Blue Chip' fertilizer, eighty pounds

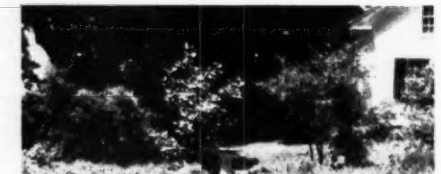
to one thousand square feet. Seed composed of the very best improved grasses, two pounds to one thousand square feet and mulch one bale to two thousand square feet." The cost of these two programs, without going into detail on the individual costs of each material, comes to approximately $11.50 per one thousand square feet for the old way and $10.50 for the new way. In the new way there are eight pounds of controlled-release nitrogen in the seedbed for each one thousand square feet, available over a period of several months, feeding the young, new grass steadily and uniformly to help it to produce a solid turf, more free of weeds than was ever possible with the conventional way of starting a lawn. This comparison is over-simplified for clarity and brevity. For detailed help in establishing a new lawn, consult your experiment station.

Readers will realize that I have spent considerable time in discussing the combination of superior grasses with adequate fertilization using controlled-release nitrogen fertilizers, either straight or in a mixed fertilizer. Weeds cannot find any place to grow in a turf composed of adapted grasses that have been adequately fertilized.

Up to this point I have said nothing about lime. Lime is essential in the production of good turf, because it is necessary to produce the conditions in the soil for the growth of the bacteria. Soil tests should be made periodically. Lime should be applied to maintain the soil at a pH range of 6.5 to 7.0. Soil tests and liming recommendations can be procured from your own state agricultural college or university.

In summary, I should like to re-emphasize:

1. Fertilize adequately with a controlled-release fertilizer properly balanced for the grass and the soil.
2. Use the best adapted grass that is obtainable.
3. Mow at the correct height frequently at regular intervals.
4. Remove the clippings for sanitation; fertility returned is negligible.
5. Irrigate seldom but deeply when you do. Grow the kind of grass that will still maintain good turf, even though water may be denied the lawn.
6. Enjoy your turf and use it hard. Good turf enjoys traffic and benefits from it.



A Country Housewife's Garden

By **Gertrude B. Foster**

THERE ARE TIMES in the summer when I should like to sing a song of salvias. What genus gives us perennial plants of such interesting texture and fragrance in foliage, as well as brilliant blossoms?

Helen M. Fox has written enthusiastically of this genus, of which she has been a collector for many years. In her delightful book, THE YEARS IN MY HERB GARDEN, a whole chapter is given over to the sages. Many of the large-flowered, sweet-scented, tender salvias of Mexico and our Southwest have been introduced to northeastern gardeners by Mrs. Fox's generosity with plants she has grown from seed. One of the exciting things about visiting her lovely herb garden at Mount Kisco, New York, is to see what plants from different climes she is growing this season. Usually the seeds have been brought back from her winter travels.

Last year when I visited "High and Low," Helen Fox's new home, I was astonished to find a yellow-flowered salvia. Few genera which include bright red, blue, purple, and pink among their flowers also produce yellow blooms. *Salvia glutinosa,* of the pale yellow flowers, has been called sticky sage. The foliage is not fragrant but must be rich in oils which are exuded to make the large leaves and three-foot tall stems seem tacky to the touch.

With all the beautiful and more subtly colored salvias there are, it seems a pity that many gardeners know only *Salvia splendens.* Fortunately there have been advances in the colors offered in the species through the efforts of seed growers. Not every window box, nor every park circle of cannas, has to have blood-red annual salvia in the middle any longer. Mrs. Fox has interested hundreds of herb gardeners in collecting the hardy salvias and has shared slips of many of the tender ones with them from her greenhouse. One herb nursery in Virginia has been offering the deliciously-scented, huge-leaved and large, cerise-flowered *Salvia Dorsii,* grown originally by Mrs. Fox for the education of others.

It is possible to have sage in bloom from May until November, though in our Connecticut climate the late-flowering *Salvia elegans,* or pineapple sage, had better be in the house by then. Starting with the common but valuable garden sage, *Salvia officinalis,* which blooms in May, the genus runs the gamut of colors through the whole season. This pungent, persistent-leaved gray sage, used for turkey dressing and as a source of medicinal oil, has really lovely blue flowers held in rosy chalices which remain long after the blossoms fall. This species is the classic example of God's design for bees and flowers in the Mint Family. The lower petal forms a landing platform for the honey bee. He proceeds toward the nectar cup, but to get there must trip a lever which brings the anthers down to dust pollen upon his back. Going on to the next flower, he may find the pistil ready to impede his self-imposed task and thus brush some of the golden grains upon its sticky tip.

Maurice Maeterlinck wrote a book, THE INTELLIGENCE OF FLOWERS, which scientists may decry as sentimental, but his poetic description of the sage blossom's arrangement to make use of the bee's interest is a classic. The garden sage, official herb of olden days, is shown in all its intricate detail of blossom among the glass flower collection of the Peabody Museum in Cambridge, Massachusetts. So our woody-stemmed friend of culinary fame, which many people prefer fresh rather than dried as a seasoning, has been celebrated out of the kitchen. Yet not many people recognize its pebbled gray leaves.

Even more striking than *S. officinalis* is the long-haired silver sage, *Salvia argentea.* This biennial, which sometimes is perennial, seldom fails to attract attention in the garden. It has none of the herby-scent of garden sage in flower or foliage, but it makes ro-

settes of extremely pretty, scalloped leaves covered with silky down which gives them a silvery sheen. In bloom, in June of the second year, it is not as beautiful as to leaf, but the branching, white-flowered inflorescence is showy from quite a distance.

Clary sage, *Salvia sclarea,* is the handsomest of the large hardy salvias grown in northern gardens. It is one of the easiest to grow, usually started from seed sown in midsummer. The plants make ground-hugging, wide-leaved youngsters the first season. To look at them you would have no idea that such towering spires of flowers could rise, above panniers of much-veined, somewhat hairy leaves, larger than both your hands, by July of the following summer to a height of four or five feet in good soil. In Switzerland, the leaves of young plants are dipped in batter, being held by the pedicel, and fried in deep fat. The way in which they puff up with the stem still attached has acquired for the sage fritters the name of "little mice." The recipe taken from a Swiss cookbook published in English would make enough for a party, so be sure to have a good supply of clary sage plants before making it in full proportion.

Swiss Sage Fritters

½ pound of flour
2 eggs
½ pint of wine (or beer)
Fat for deep frying
Clary sage leaves, washed and patted dry
Pinch of salt

Mix the salt into the flour and stir with the slightly warmed beer or wine and the yolks of the eggs to a smooth, firm batter. Beat the whites to a stiff froth and fold into batter. Dip sage leaves by the stem into the batter, fry in deep fat, then dust over with sugar. Sage fritters may be treated as a sweet, as they are here, or by omitting the sugar as a savory to accompany ham or cold cuts.

If the leaves of clary are little mice, the inflorescence might be compared to Cinderella herself. When the tall spikes of blue and white flowers open fully, they are set off by sharply-pointed sepals covered with shiny silver hairs and floral leaves of rose and white as showy as the flowers. From a distance the whole effect is one of fairly-like radiance, streaming from blossom stalks which are strongly perfumed with a strangely mysterious, penetrating scent. Essential oil of clary sage is an important item of commerce as a fixative for other perfume ingredients. The seeds have a mucilaginous quality when wet, which was reputed to bring with them any foreign substance lodging in the eyes, if one or more was introduced into the corners of the eyes. From this curious application came the name clary or "clear-eye."

A May-flowering, hardy perennial sage which scarcely seems to be out of bloom all summer long is *S. pratensis,* called Swiss meadow sage. The leaves are smaller than those of *S. sclarea,* but also ribbed and wrinkled looking. The blossoms are much more conspicuous than the foliage and as they vary from bright violet-blue to magenta, all blue, all white, or a nice clear pink, the species has many uses in perennial flower groupings.

Salvia Greggii, known as autumn sage, has richly scented, strap-like leaves branching out opposite each other upon the woody stems. In the South it is an evergreen shrub. Here in Connecticut we must winter it indoors, but it is well worth the trouble. The magenta flowers are of that distance-carrying shade which attracts immediate attention to even one plant in the green and gray herb garden. Stroking the bright-green, smooth-stemmed and smooth-leaved plant creates an unforgettable impression of the built-in perfume.

Much easier to propagate than *S. Greggii,* which self-sows more easily than it roots from cuttings, is pineapple sage, *S. elegans.* The foliage is also pleasantly pungent but with a really fruity odor which suggest culinary uses like those of mint. The acutely-tipped, slightly hairy, light green leaves have a crisp look when new. If the plants have plenty of water during their growing season, they will spread out to three feet in diameter and the same in height. The whole herb is susceptible to frost, so cuttings are taken in August to have plants indoors. The soft stems will root in water in two days. Sometimes aerial roots develop along the stems right in the garden in a spell of wet weather. Indoors, the scarlet flowers are a rich reward for giving plenty of water, not too hot conditions, and occasional feeding to the rapidly growing cuttings.

GROWING PLANTS
Under Artificial Light

By **Marion S. Gans**

From a paper delivered before the Garden Section of the Church of St. James the Less in Scarsdale, New York.

"LET THERE BE LIGHT." These words echo down through the ages from time immemorial. We know that without light all life on this planet would cease.

Most of us have always considered the sun as the major source of light and thought that without that source plants would wither and animal life become extinct.

This is probably true, although science is constantly discovering substitutes for nature. These substitutes often serve when the natural sources are scarce or weakened. I should hate to conceive a world without sun and wind and rain, but there are circumstances wherein it is impossible to get enough for our needs, and so we are driven to find substitutes.

Take, for example, electric power. In ancient times man manufactured all his material needs by hand. Some one discovered electricity and now electricity generates power. Water has been diverted into great dams and oil gushes from the earth to provide power, and so it goes.

It has always been recognized that plants need light to grow beautiful and strong. We thought that this light had to emanate from the sun. Recent experiments have shown that many plants can be raised satisfactorily without sunlight, provided certain specific light rays are made available. In other words, the experiments have shown that it is not merely sunlight as such but certain types of rays which emanate from the sun, which can also be produced by artificial means. The experiments have not, to my knowledge, shown whether plants grown under artificial light contain the same vital elements, such as vitamins. However, for our purposes today this does not matter, as we are going to study the use of artificial light for house plants and the raising of seedlings for planting out of doors.

In recent years several laboratories have tested the effects of various light

rays on plants. Two excellent books have been published containing scientific descriptions and explanations of fluorescent and incandescent light and their effect on plant growth. The authors have determined which types of fluorescent and incandescent rays and number of Watts give most satisfactory results. These books are GROWING PLANTS UNDER ARTIFICIAL LIGHT by Peggie Schulz, and GARDENING INDOORS UNDER LIGHTS by Frederick H. and Jacqueline L. Kranz.

The authors discuss in great detail candle-foot power, Watts, and so forth. I am afraid that much of the technical terminology is beyond my comprehension, but most of the conclusions are very clear and helpful. If you plan to use artificial lights, I urge you to read one or both books. You will find them full of good ideas for using plants as part of your interior decoration, if that is what interests you, or in raising plants in a greenhouse room as I have done.

A shelf in the kitchen, a dark corner of the hall, or the office waiting room equipped with proper light, with fresh air and plenty of moisture available, will provide infinite pleasure and interest to anyone who enjoys plants. You do not need a sunny window nor a sun parlor any more.

Perhaps you may be interested to learn about my own very modest experiment. When I started my greenhouse in the cellar, I adapted the room from one I had seen in the home of an acquaintance. This was at least six years ago, and at that time I could find no literature on the subject. Considering my abysmal ignorance and lack of scientific knowledge, it is a wonder anything survived. This same kind neighbor told me she kept the light on ten hours a day and off fourteen. For many years I followed this procedure and the results for many plants such as coleus, African violet, peperomia, and some others were satisfactory. However, I found that tomatoes, peppers and many other plants were weak and spindly. After I learned that most plants require a longer light period and, in addition to the fluorescent lamps, a certain quantity of incandescent to give the proper balance of light rays, I had better results.

It has been found, too, that certain light colors are more effective than others. White and daylight fluorescent lamps seem to give the best results. The most satisfactory balance is generally achieved when one uses one forty-watt daylight, one forty-watt white to one twenty-five watt incandescent.

If you install a time switch, that will automatically take care of your lighting problem and you can leave for a day or so and not worry .

Light, of course, is not the only factor in plant growth as you well know. Fresh air and moisture are very important. If the room is too hot and dry, you cannot expect satisfactory results. Too much heat, too much moisture, too much cold, too much dryness—all are bad for plants. Provide a healthy balance, and you will have healthy plants.

A very satisfactory method for insuring continuous moisture in the air is to set the plants in damp peat moss. My longest bench is a tray-like fixture, twelve feet long by about twenty inches wide by thirty-six inches high. It is three inches deep and lined with heavy roofing material. This is kept filled with damp peat moss, and the lights continually evaporate the moisture and keep the air in ideal condition.

The best temperature for the majority of house plants is from 55° at night to 70° during the day.

I have done a great deal of plant propagation and starting of seedlings in the greenhouse. I find too rich a soil indoors is conducive to damping off. As I note that many writers on horticulture urge disinfecting the soil used in flats and pots indoors, I presume this condition is not only my problem.

Heat has to be provided; if furnace pipes run through the greenhouse that should suffice. If not, a regular continuous heat must be furnished from some other source.

Fresh air must also be available; no sudden chills or drafts, of course.

Cleanliness is another very important factor. If walls and ceiling are painted a shiny white enamel and the floor gray, the room can easily be washed and kept shining. I use white plastic shelf paper as well. This white color acts as an efficient reflector and prevents shadows. The plants need not turn as they do in a window to seek the light, as it is all about them and they stand erect. It is also a lovely

The author at work in the "greenhouse" room in the cellar of her home

room aesthetically—it provides a beautiful setting for the plants.

When I receive cuttings or plants that I am not sure are in perfect condition, I isolate them for a few weeks. If a plant begins to look sick or wilting, I try to remove it at once. Good sanitation and good hygienic practices pay dividends.

I spray the foliage occasionally with water, and about once a month or five weeks I feed all the plants a weak solution of fish oil. This is the only fertilizer I use in the house.

When plants are blooming and attractive, I move them to other parts of my home. When they begin to look tired or faded, I bring them back to the greenhouse and they revive quickly.

If you cannot have an entire room, try a table in the cellar with lights a few inches above the plants. I know of amateur growers who have raised hundreds of African violets that way. You can use lights in a dark hall or on a kitchen shelf, as I have already indicated, and make this feature part of your decor.

To get back to the greenhouse—if you are ambitious, you may start annual seeds for the vegetable garden and the flower borders. When the seeds have germinated, extend the lighting period two or three hours. The plants will be stockier with additional light hours.

I wonder how many of you will think up ingenious ways of bringing a garden, no matter how small, into your homes.

Light Treatment in the Propagation of Woody Plants

By Sidney Waxman

Based on a talk given during the Connecticut Nurserymen's Short Course at the University of Connecticut.

BEFORE DESCRIBING HOW daylength treatment may be used for the propagation of cuttings, I should like to review the results of some of the experiments carried out during the past few years, so that you may better understand the usefulness of lighting plants during the night.

We all know, of course, that plants need light in order to grow; that they can capture light energy and use it to synthesize many complicated chemicals; and that this process involving light is called photosynthesis. The role of light with which we are concerned, however, is not photosynthesis, but photoperiodism.

Photoperiodism is defined as the response of plants in one way or another to the length of day, that is, the number of hours of light the plant is exposed to each day.

The effect of daylength, especially on the flowering of many herbaceous plants, is now well known, having been first described in detail in the classical paper by Garner and Allard of the United States Department of Agriculture in 1920. They showed that by controlling the number of hours of light per day, many herbaceous plants could either be forced to flower or be prevented from flowering, depending on how the particular species responded. Some species, referred to as long-day plants, flowered only when the days were longer than a certain number of hours; other so-called short-day plants flowered when the days were shorter than a certain number of hours. They also showed that not all species respond to daylength, and plants that flowered regardless of the daylength or photoperiod were called day-neutral.

Now, regarding the effect of photoperiod on trees and shrubs, we are not as much concerned with flowering as we are with overall growth.

When we observe the growth of trees under natural conditions, using the flowering dogwood as an example, we find that new growth starts in the spring when temperatures become high enough. Active growth occurs in two spurts during June and July when the days are fairly long and temperatures high. However, during August and early September, when temperatures and moisture conditions are ideal for further growth, the trees become dormant, that is, they do not produce any more leaves nor do they grow in height.

If such woody plants are taken into the greenhouse during the summer and maintained there throughout the fall and winter, they stop growing at approximately the same time as identical species outdoors.

What is it then that causes the dogwood to stop its growth? An obvious factor other than temperature, which varies according to the time of the year, is the length of the day.

One year-old cuttings of flowering dogwood. Both of the above plants were six-inch cuttings rooted in August. The small plant was grown under normal day-length; the tall plant received eighteen hours of light daily.

On June 21, the longest day of the year we enjoy, in the latitude of New York, about sixteen and a half hours of sunlight. From this date on, the daylength gradually decreases until December 21, the shortest day of the year, when we receive only ten and a half hours of light.

Thus we find that when the days are longest, growth is most active and, as the days become shorter, growth stops and plants become dormant.

The writer carried out a series of experiments during the past three years to determine the effect of daylength on various phases of growth of trees and shrubs. To eliminate any effects that photosynthesis may have had, it was so arranged that all groups received the same amount of sunlight. This was accomplished by exposing the plants to sunlight from 8:30 a.m. to 4:30 p.m. At 4:30 p.m. each group was covered with a black cloth shade until 8:30 the following morning. It was during this shaded period that the various groups were illuminated with incandes-

An additional year's growth was obtained on flowering dogwood cuttings subjected to long photoperiods when in the propagating bench. The light treatments were as follows (from left to right): continuous light, eighteen-hour day, nine-hour day, and normal day.

cent light of low intensity for different periods of time to provide long, intermediate, and short photoperiods.

The results showed conclusively that it is actually the time span of light that regulates the growth of many woody plants and not the amount of sunshine. As a rule, long-day conditions tend to keep the plant in active growth, and this results in a comparatively large plant. Short days, on the other hand, tend to inhibit growth, either by retarding it or by actually stopping it completely.

Plants exposed to short photoperiods of thirteen hours or less were forced into a premature state of dormancy. Long photoperiods of fifteen hours or more tended to keep the plants actively growing and correspondingly delayed the onset of dormancy. When the plants were subjected to long photoperiods in the greenhouse, the need for the winter rest period was eliminated. Flowering dogwoods were maintained in this "active" state for over twenty months, at which time they were too tall to be illuminated.

Another interesting example is the Japanese maple which, under natural conditions, is a slow-growing tree. However, when placed under continuous light, it grew steadily at the fantastic rate of one-half inch per day.

It was found that daylength plays a role not only in flowering and vegetative growth, but also in the rooting of cuttings. Cuttings subjected to long photoperiods in a mist-propagation bench produced approximately twice as many roots per cutting as those subjected to short photoperiods. Increased rooting by long photoperiods has been found to occur on cuttings of *Rhododendron mucronulatum,* pink-flowering dogwood, white-flowering dogwood, magnolia and weigela.

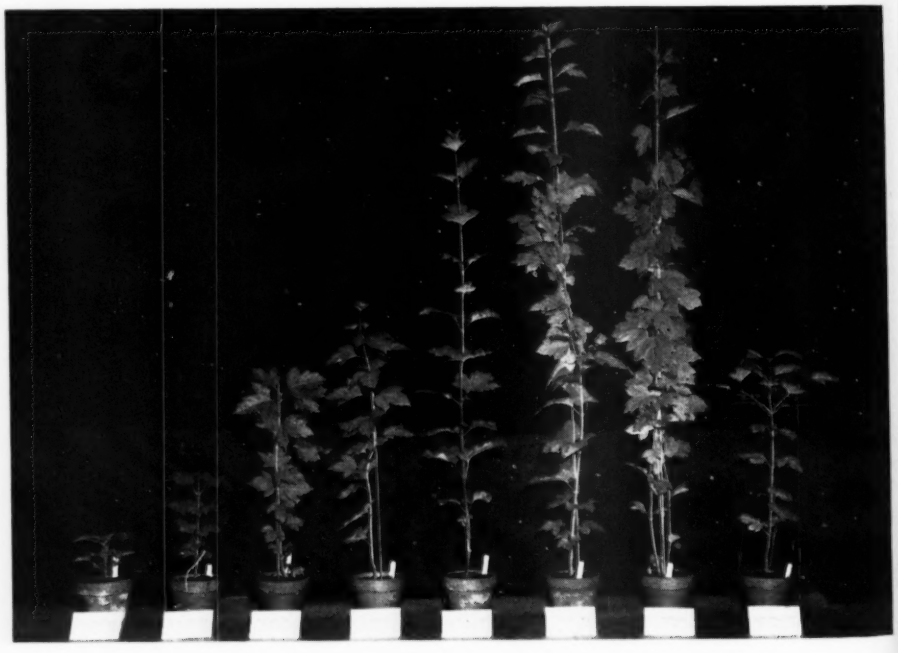
The use of photoperiod treatment for the propagation of cuttings, finally, is not merely for the purpose of producing more roots, but for several reasons of greater significance:

I. In the process of root initiation on cuttings of many woody plants, including dogwood, no further vegetative growth develops after the cutting is removed from the parent plant until the following season, after the dormancy of the buds has been broken.

Cuttings of flowering dogwood, which were given long photoperiods only when in the propagation bench, unexpectedly produced an additional year's growth three weeks following their removal from the photoperiod treatment. Thus, by merely subjecting cuttings to long photoperiods for approximately thirty days, an additional year's growth was obtained.

II. Another feature, which is somewhat indirectly concerned with propagation but nevertheless of great consequence, is revealed in the lighting of stock plants. Where it is desired to increase the number of plants that are rare or highly valued, subjecting them to long photoperiods will keep them in active growth so that they will serve as a continuous source of cutting material.

Thus, if we continually subject the stock plants, as well as the rooted "offspring," to long photoperiods we could, in a relatively short period of time, increase the number of plants considerably; for each rooted "offspring" would soon be a potential stock plant.



The growth of *Viburnum opulus* is controlled by the length of day. All the plants shown were the same size at the beginning of the experiment. In March they were put under the following light condition (from left to right): nine hours, twelve hours, nine hours plus one hour at midnight, fifteen hours, eighteen hours, twenty-one hours, twenty-four hours, and normal day. They were photographed in September.

HOW PLANTS GROW

By Howard E. Joham

In 1940 plant physiologists and plant chemists felt the answer to the problem of photosynthesis was within their grasp. The University of California had at that time made available a source of carbon eleven. Today, seventeen years later, the problem of photosynthesis still remains to be solved, although great strides have been made. When we consider that the mechanism of photosynthesis is only one of many complex systems at work within plants, we can understand why the answer to "How do plants grow?" also remains to be solved. We have only scratched the surface of this issue.

Our knowledge of how plants grow largely is concerned with the influence of environmental factors on plant growth. Growth can be considered as cell division and cell elongation, thus an increase in plant volume. All plant cells, however, are not alike, some being more complex than others; thus, it is necessary to enlarge our concept of growth to include differentiation or the change in complexity of cells. Development is the progressive changes which lead towards flowering and maturity and involves both growth and differentiation.

Environmental factors such as water, nutrients, light, and temperature have a marked influence on growth and development of plants. Which environmental factor is the most important? Of course, there is no "one most important" factor, and I think this can be clarified by the following illustration. If water is withheld from the plant, death will occur within a few days. If nitrogen is removed from the plant's environment, death may occur in several weeks; however, if the plant's environment is deficient in some micro nutrient such as molybdenum, death may not occur until the second or third generation. In each case the reproductive cycle has been broken, and the species will not survive. Thus, the question of importance of environmental factors becomes involved with time, since the end results in many cases will be the same. Quantitatively more water moves into plants than all other materials combined. Of all materials moving into plants, water accounts for ninety-nine and nine-tenths per cent. This means that ten tons of freshly cut hay contains eight tons of water (water of hydration) and two tons of dry matter. If we were to burn the dry matter, we would liberate another ton of water (water of chemical combination). Thus, the ten tons of freshly cut hay actually contained nine tons of water. Water of hydration and chemical combination do not constitute all of the water absorbed by the plant. To produce one pound of dry matter approximately five hundred pounds of water passed through the plant. This is termed water of transpiration. Thus, to produce our two tons of dry hay, one thousand tons of water of transpiration were required.

For plant growth there are at least fifteen essential nutrient elements. These are carbon, hydrogen, oxygen, nitrogen, sulfur, phosphorus, potassium, magnesium, calcium, iron, copper, manganese, zinc, boron, and molybdenum. This list is by no means complete and will in the future be enlarged as our techniques of studying plant nutrition improve. How are these elements available to the plant? Carbon and oxygen are absorbed as carbon dioxide from the air. In addition, oxygen is also absorbed as 0_2 from air. Hydrogen enters the plant combined with oxygen in the form of water. The remaining twelve elements are supplied by the soil and absorbed by the roots. The first six elements in our list can be referred to as the "building elements." These account for the bulk of plant material and form the carbohydrates, proteins, fats, and other materials found in the plant. These materials form the cell walls, protoplasm, and cell inclusions.

Calcium, magnesium, and potassium are the "balance elements." These elements are considered to have specific and general functions. For example, magnesium is a necessary constituent of the chlorophyll molecule. This is a specific function. In addition, as a cation, magnesium may also serve in the proper pH balance of plant cells. The latter function is general and may be carried out by potassium and calcium as well as magnesium. In cotton it is possible to substitute, to a limited extent, sodium for calcium and potassium in the nutrition of the plant. In the absence of calcium or potassium in the cultures of cotton plants, fruiting is very limited. The addition of sodium to such cultures will greatly stimulate fruiting activity.

The remaining six elements are known as the "catalytic elements." These elements are required by plants in minute amounts and are often referred to as the micro nutrients. Many chemical reactions are known to be catalyzed by these elements.

In the proper nutrition of plants, all of the essential elements must be available and in balance. A deficiency or an excess of any one element may throw the nutrient condition out of balance and result in a limitation of plant growth.

The transpiration ratio, the pounds of water transpired per pound of dry matter produced, is markedly influenced by the nutrient status of the plant. In proper nutrient balance the T.R. is low, while a deficiency of any essential element will result in an increased transpiration ratio. As mentioned previously, the T.R. of corn growing under good nutrient condition may be approximately five hundred. When grown under nitrogen deficient conditions, this ratio may rise to one thousand or greater. Thus, under fertile conditions more efficient use is made of the available water.

In addition to water and nutrients, light is also an important environmental factor concerned with plant growth. Plant physiologists led by Drs. W. W. Garner and Harry A. Allard have classified many plants, depending upon their flowering response to day length, as short-day, long-day, day-intermediate, and day-neutral plants. In this re-

(Continued on inside back cover)

BOOK REVIEWS

POPULAR MECHANICS LAWN AND GARDEN BOOK. Edited by C. Robert Bilbrey, in collaboration with James Burdett. 188 pages, illustrated, indexed. Popular Mechanics Press, Chicago, Ill. 1957. $2.50

I began reading this book with great enthusiasm, happy that here at last is a book to help the average home owner. Its basic ideas on landscaping and other phases of gardening and lawn construction are very good and easily understood.

The author went to great extremes to outline clearly the steps the average home owner should take in beautifying his land. At times I felt that he went too far beyond the average home owner, and became a little too much "Popular Mechanics" to appeal to the layman.

The average home owner is not interested in methods of surveying his land or in the drawing-up of plans. Neither is he interested in fluent descriptions of seeds and flowers. He would rather have concrete examples of proper grouping of plants, definite examples of the kinds of shrubs to use and what seed mixtures to buy, and what to look for on the seed tag.

The book also has a few questionable statements, such as—determining the size of the earth ball one should dig up when moving a tree, and that bent grass seed costs more than the average home owner cares to pay, which more or less discourages the use of bent grass in a lawn. It is also questionable, when cutting grass to raise or lower the cut depending on the season of the year. I feel that the less an average home owner tinkers with a mower the better off he will be. Adjust for a high cut one and a half to two inches in the spring and let the mower stay that way. Although just as important as the height of the cut, no mention is made of how to adjust the cutting blades so that a clean cut is always maintained.

The types of mowers shown are in good quantity, but not enough well-known brand names are mentioned.

However, the few misgivings in POPULAR MECHANICS LAWN AND GARDEN BOOK are overshadowed by the wealth of information it contains. The book is worth having around the house.

NICK PECORA
Huntington, L. I.

BE YOUR OWN NURSERYMAN. Robert Scharff. 223 pages, illustrated, indexed. M. Barrows & Co., New York. 1957. $3.50

This is a practical guide for the home owner who plans to save money when landscaping his property—by buying small stock and growing it on in his back-yard nursery until large enough for permanent planting. It is written as a "how-to-do-it" book from the author's own experience as an amateur nurseryman.

Every step is covered from the procuring of small plants through the planning, preparation of the soil, and planting of the nursery. Instructions are given for the propagation of trees and shrubs, the building of garden structures such as hot beds and cold frames. A list of garden tools and equipment is given for the basic maintenance of the nursery, and the lists of woody plants should be helpful to the beginner when studying nursery stock that will fit into his plans.

I have some misgivings about growing trees and shrubs for profit in a small back-yard nursery, as stated in the last chapter. I do feel, however, that the home gardener will enjoy his garden more by growing some of his own plants from young plants, cuttings or seeds.

STEPHEN G. CUTTING, *Horticulturist*
Yale School of Forestry Research
Valhalla, N. Y.

TREE CARE. John M. Haller. 224 pages, illustrated, indexed. Macmillan, New York. 1957. $5.95

This volume is expertly and interestingly written for the average home owner with a desire to "do-it-yourself."

Phases of tree work for which special equipment or experience are required are omitted entirely or treated sketchily. The author says, "Do not try to spray your own trees." Also, "large cavities should be entrusted only to a trained arborist." He could well have included bracing and cabling in this category, as well as lightning protection for valuable trees.

How many readers will agree with the author's definition of a tree, "A tree is a plant that stands of itself and can be climbed in." The average tree man can name numerous trees that cannot be "climbed in," and yet are all designated as trees by dendrologists.

The home owner will probably be confused when he reads provisions for drainage of cavities in trees and then finds later on the statement, "To make a perfectly airtight and watertight seal at all points." You just cannot "drain and seal" the back of a filling at one and the same time. The author's method of sealing the opening where a hollow branch has been removed from a tree with galvanized tin is recommended by tree men only as a temporary solution.

R. R. FENSKA, *President*
Westchester County Tree Protective Association

THE BOOK OF TREES. THE BOOK OF SHRUBS. William C. Grimm. 363 and 522 pages, respectively, illustrations, index. The Stackpole Co., Harrisburg, Pa. 1957. $5 each

With the recent spate of excellent manuals and other literature on our northeastern flora to work from, an author is exceptional indeed who cannot now offer a good book on regional plants. Be assured that Mr. Grimm is not exceptional in this sense. The illustrations are so, however, that is to say extraordinarily good. Every species is originally illustrated in a bold and accurate hand. The drawings are full-page sized and clearly delineate, as the description and keys clearly characterize both the summer and winter features of the trees and shrubs.

The style and format of the two books are the same. Pennsylvania is the area covered but that, of course, embraces the woody plants of the greater part of our northeastern range. Yet, a New Yorker might wonder at the omission of some species—for example, *Morus alba, Broussonetia, Paulownia, Rhamnus frangula, Rubus phoenicolasius.* The nomenclature used in THE BOOK OF TREES was Rehder's, whereas that in THE BOOK OF SHRUBS was the Fernald's, eighth edition. This has resulted in the *Amelanchier canadensis* of the two books being different species.

Errors are at a minimum. The illustration of the winter twig of *Staphylea* does not show stipule scars. In the summer key to the species of oaks, the leaf pubescence character given for distinguishing *Quercus phellos* from *Q. imbricaria* is inadvertently reversed. The maples do not have "palmately compound" leaves; probably "palmately veined" was intended. Grimm attributes the formation of witches' brooms in the hackberry to the mite *Eriophyes*; F. E. Lutz in FIELD BOOK OF INSECTS, calls the insect causing the gall *Pachypsylla*, the jumping plant lice. The tiny, oval, orange and black insects can be easily seen by cutting the young galls found at the nodes of the branchlets.

Are the fruits of the *Ailanthus* correctly drawn? Their identity is clear (which is sufficient for our purpose), but are they delineated actually true to nature? No, the reviewer thinks. Errors appear in the most unexpected places! The samaras are shown singly on each pedicel, as though that were a constant character; actually however, they may be up to five in number. There should be a faint sinus on one margin at the level of the seed; it is from this sinus that a marginal strand connects with the pedicel. The samaras shown on the extreme left and right sides of the cluster would indicate contrary torsions in their upper portion, whereas all *Ailanthus* fruits examined by the reviewer (let the reader check for himself!) twisted in the same direction without exception, always dextrorsely, like the samara shown on the left in the drawing.

After presenting the distinguishing summer and winter characteristics for each species, the author offers very interesting general comments. For example, he states that *Kalmia latifolia* with a trunk six feet ten inches in diameter has been found in the Great Smoky National Forest, and that *Ilex opaca* occasionally attains a height of nearly one hundred feet in the southern part of its range. The incredulous reviewer checked the first remark. True enough, he found the reference in the National Geographical Magazine for August, 1936, where a photograph appears of a mountain-laurel with a gnarled buttress eighty-two inches in diameter!

JOSEPH MONACHINO

JOHN KIERAN'S TREASURY OF GREAT NATURE WRITING. John Kieran (edited by). 640 pages. Hanover House, Garden City, N. Y. 1957. $4.95

It is difficult to know where to begin and what to cull out of this so-rich collection of wonderful nature tales. John Kieran has certainly found treasure in abundance in his library, and once the reader has delved into the depths it is almost impossible to come up for air. Every branch of nature science is covered and something to interest every taste has been chosen from the works of the great writers. Exploration, horticulture, ichthyology, herpetology, botany, meteorology, something of the heavens, much of the good earth, just plain common sense, and lots more is crammed between the covers of a fat volume which should grace every library shelf. Merely to get back to Walden Pond again after a long interval away from Thoreau, or to read what Emerson says: "If a man would be alone, let him look at the stars," these are reasons for buying the book.

The chapter on Carl Linnaeus is worth any horticulturist's while. I once had the great delight of visiting "Hammerby," the summer home of the great Swedish botanist, where I saw the tiny bed where he slept, the small house in the woods where he

taught his eager pupils, and the masses of *Lilium Martigon* which flourished so abundantly everywhere. This book took me back and added to my happy memory.

Let me skim hither and thither in the pages I have read and come up with some of the curious facts I found there. That Izaac Walton, in his COMPLEAT ANGLER told of a huge pike which bit the nose of a mule! Of Steller, the hardy Bavarian, who went with Bering to explore the unknown Alaskan islands and was probably the first white man to set foot on them. Of Audubon and his account of the passenger pigeon whose migration sounded to him like a hard gale at sea. Of Isaac D'Israeli, father of Lord Beaconfield, who wrote of the introduction of mulberry trees and silkworms into France in the days of Henry IV, which gave rise to the silk industry for which France became famous. Darwin's voyage on the "Beagle" to Terra del Fuego describes the desolate terrain and the miserable poverty of the natives. Today cruise ships stop there and things have changed. Herman Melville thought whales were to be divided into Folio, Octavo and Duodecimo groups, like books in a library but Darwin considered whales fish, not mammals. Charles Waterton wrote a quite humorous account of catching a cayman on the Essequibo River in Guiana, and Richard Jeffries wrote whole pages in praise of dandelions! William T. Davis, a life-long resident of Staten Island, wrote delightfully of his wanderings on the South Beach of the Island in the days when it was a wilderness, and found flotsam and jetsam of untold interest (to him) on the sands as, for instance, "a coffee pot with a blameless bottom."

Edwin Way Teale, that author I enjoy so much, has a chapter on dragon flies, telling of prehistoric ones as large as hawks (terrifying idea!) and making the present day varieties sound fascinating.

T. H. White tells of capturing snakes of all kinds and how he took one to church "to make him a Christian and to comfort me during the sermon!" There are other methods to accomplish this end which might appeal more to the average reader! Also Gilbert Klingel's admiration for the octopus. The ones I have seen certainly gave me the shivers, and trying to eat them in Samoa was more than I could face! William Beebe tells us that another Ice Age is on its way, but to comfort you, it will not be in our day. And did you know that the early Greeks thought that Zeus was the father of eels because even then no one knew where and how the creatures came into being? Poor old Zeus fathered everything which people did not understand, it seems. Maybe he had something to do with the ridley turtle which up to now no one has been able to catch at either love-making or egg-laying. After saying all this I have not told you the half of the delights in store for you in this book. It is a whole library condensed into one volume, with poetry tucked in between the chapters. Riches indeed.

LOUISE D. HOLTON
Essex Fells, N. J.

A JOY OF GARDENING. V. Sackville-West. 210 pages, indexed. Harper & Bros., New York. 1958. $3.50

This engaging and stimulating little book is a collection of short articles from two of the author's books, IN YOUR GARDEN AGAIN, and MORE FOR YOUR GARDEN, both published in England. The choice of material in A JOY OF GARDENING, made especially for American gardeners, is indeed a happy one.

Although Miss Sackville-West is an English woman writing of English gardens and gardening practices, the editor of the present volume reminds us that "Many of the differences in the gardens of the two nations are actually matters of habit—old customs and short memories that lead us to plant certain things, to place certain plants in juxtaposition, and to overlook other equally felicitous materials and patterns." She concludes, "If this book revives some forgotten images and stimulates American gardeners to new enterprise, it will have served its purpose well. In any case, it cannot fail to bring pleasure." This reviewer agrees.

As one reads this book he has the pleasant illusion of visiting Miss Sackville-West in her English garden. On the first visit, one sees her crocuses in the very early spring among tiny shrubs, *Corylopsis spicata* and *Corylopsis paucifolia,* "hung with yellow moths of flowers all along their twiggy branches." Corylopsis belongs to the Witch-Hazel Family. Thus the "yellow moths of flowers" which is characteristic of the author's felicitous use of words. Corylopsis, which is seen so seldom in this country, might be a happy replacement for the ubiquitous forsythia.

Again our author-guide discusses with us the "little irises" and tells us how, contrary to the authorities, her *Iris primula* has not been divided for ten years, and yet this year it has never flowered better. She continues, "It is the fact that many plants do better if they get their roots under stones." And she urges us to plant the "litle irises" along stone paths, rather than at the edge of the herbaceous border.

Miss Sackville-West introduces us to a gallery of fascinating gardening personalities. For example, there is Miss Isabella Preston of Ottawa, whom she confesses that she doesn't really know. But she gives us a charming imaginative portrait of the lady in "Lilacs of loose delicacy." She describes 'Elinor,' her favorite among the hybrid lilacs that Miss Preston has introduced. Life from now on will be incomplete without some Preston lilacs.

The summer section, titled "Where did Gabriel get a lily?" is an entertaining combination of fact, whimsy, and old wives' tales, narrated in a gay and lively manner.

This is not a book to be read at one sitting; rather it is to be picked up at leisure, to savor and enjoy again and again.

HULDA L. TILTON
Linwood, N. J.

THE WARBLERS OF NORTH AMERICA. Ludlow Griscom and Alexander Sprunt, Jr. (edited by). 356 pages, illustrated in color (by John Henry Dick) and black and white; indexed. Devin-Adair, New York. 1957. $15

To the ancient and honorable company of bird-watchers (of which this reviewer is a humble member), the warblers of America are at once a delight and a problem, a challenge and a reward. About one hundred and sixteen species are known, all insect-eaters, mostly migratory, charmingly and elusively decorated in various hues, with yellow predominating. The flow of warblers north is eagerly awaited in the spring; their return in the fall, with confusingly altered plumage, is the despair and joy of the amateur. Most of them do not "warble," but all have distinctive calls or short songs. Previous authoritative books devoted entirely to this group of birds are both unsatisfactory and out of print. The present volume, therefore, is just about a "must"—in spite of the price—for the enthusiast in this pursuit. The thirty-five colored plates are superb—not as works of art but as means of recognition of some eighty-five species, many of which (the tropical ones) have never before been shown in color. The accompanying text, by various authorities, details habits, food, range (with maps), and so on. There are no pictures of the fall plumage: but one cannot have everything, and the text contains notes on this matter. There are chapters on the migrant warblers in their winter quarters, on warblers of Mexico, on warblers in Alaska, and on other topics.

The only fault I can find in this sumptuous and desirable volume is in the representation of the songs. "Switty, switty, switty, tsi-tsi-tsi-zee" might be a useful supplement to but is hardly a substitute for Mathews' classical musical notations.

H. W. RICKETT

FLOWER SHOW RIBBON-WINNING ARRANGEMENTS. Mrs. Raymond Russ Stoltz. 146 pages, illustrated with 66 plates. Charles Scribner's Sons, New York. 1958. $5.95

This first extensive publication dealing almost exclusively with ribbon-winning flower show composition is a credit to the arrangement art and to the author. Except for nine tri-color winners the illustrations represent the author's achievements.

Based on winning experiences in interpretive competition, accounts are organized into pleasing sequence including great variety in challenging subjects. Lyrically narrated analysis explains how a mental picture is suggested by a schedule's class title. Details describe its growth through the selection of materials and design elements to finally emerge as visible form. Resultant compositions run the gamut from interpretations of tangible fact translations to intangible feelings or symbolical extractions from life.

An outstanding merit demonstrates that interpretive arrangement is not a casual work; there is reason for every relationship. A chapter on structural units aids understanding.

Although competitive composition is emphasized, the author explains parallel approach to home arrangements, indicating potential appeal to all arrangers regardless of experience or special interest.

The wide reach into interpretive realm is bound to stimulate and inspire readers. It is probable that it will lead arrangers to pay more attention to endowing their own work with definite meaning and greater originality, and this in itself would be worthy accomplishment for this handsome volume.

Color plates are inferior to the exceptionally clear half-tone illustrations but this is minor criticism since each is repeated in the black and whites.

EMMA HODKINSON CYPHERS
Clifton, N. J.

VEGETABLES FOR GARDEN AND EXHIBITION. S. M. Gault. 268 pages, illustrated, indexed. Transatlantic Arts, Hollywood - by - the - Sea, Fla. 1956. (Printed in Great Britain.) $12

It is a pleasure to see a book so intelligently designed, so well printed and produced as this. The page size and the type make for easy reading, the arrangement of the subjects, divided into subheads and titled paragraphs, enable ready referenee. The illustrations include about seventy-five photographs, clear and informative, and many line drawings. For an English gardener

who takes the subject more than casually, it should be an admirable book.

The author is an English professional gardener, of a competence that is evidenced by the gold medals and other distinctions that have rewarded his work, particularly in shows which include competitions for vegetables. This is reflected in the large amount of space given at each species to preparations for prize winning, to which we are little accustomed in this country and which is not always the same thing as obtaining the best yield.

For the American gardener, the chief interest of the book will be in a comparison of English methods with his own, not for practical guidance. Our climates and seasons invalidate Mr. Gault's calendar of works; our methods of cultivation are different. Cloches, or movable glass covers, are unknown to us, nor do we use soot. Double digging and trenching we avoid; well-rotted manure, scarce though it be in England, is unavailable to the average gardener here. Many of the vegetable varieties recommended are unobtainable in this country, nor would they be the best for our conditions. The insects and diseases which afflict our plants are in many cases different and so, consequently, are their controls.

This agreeable volume is therefore, in the United States, for the connoisseur of garden literature rather than for the practical gardener.

FRANCIS C. COULTER
Orange, Conn.

SAINTS AND THEIR FLOWERS. Gladys Taylor. 108 pages, illustrated. Morehouse - Gorham Co., New York. 1956. (Printed in Great Britain.) $2.75

This little book details the association of flowers with religious legend. Starting with Indian, Egyptian, and Hindu mythology, the author shows how primitive floral symbolism was transferred to Christianity. We wander pleasantly through chapters on "Gardening Saints," saints of the four seasons, and others, to "A Nosegay," in which the writer's own religious devotion is apparent. There are lists of saints, of flowers, and of books, but regrettably no index to the multitude of legends. Reliability of the information is made a little dubious by the assignment of Buddha to 6000 B.C. and the statement that the Romans "Latinized" the names of Greek deities.

H. W. RICKETT

THE HOUSE BEAUTIFUL BOOK OF GARDENS AND OUTDOOR LIVING. Joseph E. Howland. 376 pages, illustrated, indexed. Doubleday & Co., Garden City, N. Y. 1958. $10

This very handsome volume is largely a reprint of material which appeared in House Beautiful Magazine, prepared and edited by Dr. Joseph E. Howland who was then Garden Editor. It weighs over three pounds and costs about three dollars a pound. I would say that it is worth the money to landscape men and those who are interested in gardening trends, or who like new ideas and handsome books to keep on the library table. It also belongs in any important garden club library.

In it you will find much to covet, even if it is beyond your means or your desires. There isn't much comfort here for those who like old-fashioned, informal gardens at moderate cost. But there are ideas that even the most modest gardener can adapt to his small acreage and budget. Some of the gardens are so specialized and designed for conditions in California and other warm-climate regions as to be impractical and virtually useless for those living in the East or other cold-climate states. But don't dismiss the good because of the ideas and designs which you cannot use. Look through the book and you cannot help but admire the effort and ingenuity which the author has employed to produce a very beautiful and stimulating volume.

One wishes that the names of owners and locations might have been included; also a better arrangement and interpretation of the garden trends and styles might have helped to make the book more instructive for the average "guy or gal" whose garden budget and time are limited.

ANDREW S. WING
Riverside, Conn.

PARADISE NORTH: AN ALASKAN YEAR. Henry D. Barrow. 242 pages, with drawings by Susan Barrow. Dial Press, New York. 1956. $4

To read PARADISE NORTH is to realize immediately that the book is not a mere travel story. The information is authentic, full of facts which old-timers in Alaska can vouch for in every particular, truly day-by-day frontier living.

But in spite of the hardships of frontier living, the Barrows with their keen appreciation of nature in its various forms had ample reward. The experiences they had in their tide-pool are graphically and accurately described. The book takes us away from the hurly-burly of city life and gives us vicariously a quiet, peaceful interlude in a world far removed from wars and rumors of war.

MARGARET MCKENNY
Olympia, Washington

FOREST TREES OF AUSTRALIA. 230 pages, large octavo, cloth. Illustrated with 91 halftone plates and 11 color plates. Forest & Timber Bureau, Dept. of Interior, Commonwealth of Australia, Canberra. 1957. $7.50

This comprehensive timber manual of common forest trees of Australia (omitting the rain forest species of northern Queensland) is the first of its field in many years. In handy, small form it is exceptionally valuable for foresters and other workers with timbers. Of course, as with all timber volumes, it alarms the layman to discover that all "hardwoods" are not hard, may indeed be quite soft; and the softwood genera always include some trees that have hard wood. After you resolve this paradox, you begin to enjoy the trees. Excellent illustrations are an important feature.

EDWIN A. MENNINGER
Stuart, Florida

HOW TO IDENTIFY PLANTS. H. D. Harrington. 203 pages, illustrated by L. W. Durrell. Sage Books, Denver, Colorado. 1957. $3

This little book is designed as a companion to a local flora in introductory taxonomy courses. It is reminiscent of the old Gray's LESSONS IN BOTANY, now out of print, which served this function for many years. A minimum of taxonomic theory is followed by a systematic, illustrated treatment of the commoner morphologic terms used in taxonomy. Twenty-four pages near the middle of the book are devoted to a list and discussions of books, principally manuals and floras 'for the identification of wild or cultivated plants in North America north of Mexico. The book ends with an illustrated alphabetical glossary, including the terms presented in the earlier section as well as some others. The printing, done by offset, is not of the best quality, but is quite legible. Although rather on the homespun side, the book should adequately serve its intended purpose.

ARTHUR CRONQUIST

ALL THE PLANTS OF THE BIBLE. Winifred Walker. 244 pages, illustrated. Harper & Bros., New York. 1957. $4.95

It is to be regretted that the text of this book is not as accurate as the illustrations are lovely—they are really artistic. A reviewer, in going through the book with the intent of preparing a review for publication purposes, noticed the errors, called them to the attention of the publisher, and a revised edition will be published shortly.

BULB GROWING FOR EVERYONE. J. F. Ch. Dix. 147 pages, illustrations by J. F. Van Der Broecke; indexed. Pitman Publishing Corp., New York. 1957. (Printed in Holland.) $3.95

Here at last is an English translation of the authoritative Dutch bulb book, *Bloembollen*, which for many years has been regarded as a standard work on the cultivation of bulbs. This book reflects on every page Mr. Dix's wide knowledge and experience in the world of Dutch bulb growing.

The author has given a clear picture of the distinguishing features of the various bulbous plants and has tabulated the different species with their characteristics, thus clarifying a generally confusing phase of bulb culture.

He explains in detail how bulbs should be forced to produce early blooms indoors; but, of course, the greater part of the book is devoted to the normal outdoor growing process. Although the work is devoted primarily to the tulip and the daffodil, there

(Continued on page 147)

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NEWS, NOTES and COMMENTS

Excerpts from The President's Newsletter

The Display Committee has arranged a temporary exhibit of "Summer Gardening," the photographs being taken by T. H. Everett, and for the fall an exhibit of seed mosaics by Eric Mann. The Display Committee is working on permanent exhibits of monocots, dicots, weeds, seaweeds, orchids, ferns, and a diorama of mushrooms in the east wing of the Museum Building.

Dr. Alma Barksdale is collecting water molds in Europe this summer—she expects to visit England, Strassbourg and South Germany—on a grant from the American Philosophical Society . . . Dr. Harold W. Rickett left early in May for Utrecht to work for five weeks with Dr. F. A. Stafleu, Secretary of the International Association for Plant Taxonomy, on *Nomina conservanda;* thereafter he will spend several weeks in London. This research is being undertaken on a grant from the National Science Foundation . . . Dr. David Rogers and Dr. Taffe Tanamoto (of the International Business Machines Corporation) are cooperating on a pilot study of classification techniques, using the "704 Computer", to assist in taxonomic research . . .

T. H. Everett reports that fifty-one plots —each 6 x 10—have been planted by children under the Outdoor Gardencraft program, in onions, beets, spinach, lettuce, carrots and radishes. Mr. Everett represented the Garden at the Bailey Centennial celebration at Cornell University . . . Mrs. Dorothy E. Hansell attended the Spring Garden Tour of the Garden Club of New Jersey and the Eastern Orchid Congress in New York City in May. She has been appointed to serve with Mrs. Kenneth Smith of Dongan Hills, Staten Island, and Mrs. Frederick P. Walther of Montclair, New Jersey, as co-chairmen of arrangements for the annual meeting of the American Iris Society in 1961, one day of which will be spent at The New York Botanical Garden . . . Dr. and Mrs. Alcides Teixeira were honored by the Garden staff at a tea prior to their departure for Brazil where, after a year's leave of absence to study wood-rotting fungi in the United States, Dr. Teixeira resumes his directorship of the Sao Paulo Botanic Garden.

The Annual Meeting of The New York Botanical Garden

Charles B. Harding, President of The New York Botanical Garden, opening the Annual Meeting held in the Snuff Mill on May 22, 1958, commented on "the largest attendance ever gathered for an annual meeting of this institution; it is most gratifying to see this interest."

Dr. David D. Keck stated that as his report as Acting Director was already printed and available to the members at the close of the meeting, he would not read it. Instead he would make a few remarks about the first months of 1958 . . . "Our reputation as a botanic garden rests on the accomplishments of our scientific staff and also on those of our horticultural, gardening, educational and informational services. We are in contact with the public along many fronts.

"This spring we have achieved a new unity of purpose that is carrying us far in all places of our operation. A special type of cooperation is demanded of our staff. While, in the case of one, his principal joy may be defined as research in the herbarium, he is called upon to give a course or two in our Educational Program, to lecture to garden clubs affiliated with the Garden, to serve as a tour guide, possibly to handle graduate students, certainly to impart information to the public by phone, face-to-face, and by letter. His advice may be needed on museum exhibits; he may be asked to prepare popular articles and review books. Each one of us is used, more or less, up to the borders of our versatility.

"Our head gardener, Louis Politi is, for instance, a TV and radio performer in rather frequent demand—his appearances are strictly in the interest of botanical education as far as I'm aware! His department has been active this spring adding to the richness of our plant collections . . . from seed alone he is attempting to add about one thousand kinds of plants not now represented in our collections.

"The momentum for this gardening activity has been building up for some time. Mr. Pfander and Mrs. Hansell worked together last year to interest growers in helping us to build our display collections of . . . dahlias, iris, daylilies, gladiolus, peonies, narcissi, tulips and others as detailed in the printed report . . .

"Mr. Rampino fills one of our most demanding positions, as the services of his department are required by almost everybody and simultaneously. Yet he was able to utilize the rainy days of winter to good advantage indoors, making new exhibit facilities in the Museum and applying paint to areas where most needed . . .

"The scientific staff in the Research-Laboratory has continued to conduct its research programs efficiently and effectively, while awaiting the ultimate answer to the question as to who will direct the work.

"The increased public responses to the Educational Program conducted by Mr. Everett and his department have resulted in almost one third more registrants for courses in 1957 than in 1956, a trend that has continued in 1958 . . .

"I want to thank Mr. Harding, the Board of Managers, the Advisory Council and Volunteer Associates, and last but by no means least a very faithful and cooperative staff, uptown and downtown, who have made my tasks less difficult and indeed more enjoyable. The support of the individual members of the Garden has also been most important to all of us.

"I have told Dr. Steere that he will find The New York Botanical Garden to be, throughout the length and breadth of its structure, a vital organization that moves forward in confidence that daily it is playing an increasingly more useful role in the cultural life of our city and in the world."

Distinguished Service Awards were presented by The New York Botanical Garden to Mrs. James Cox Brady, Dr. Edmund Henry Fulling, Mr. and Mrs. R. Gordon Wasson, and Mrs. Thomas J. Watson.

Dr. P P. Pirone read the citation given to Mrs. Brady: in part—"The Garden is most fortunate in having the friendship of Eliot Chace Brady. Her active support of the work of the Garden possibly was induced by her keen interest in gardening which she gained at an early age from her mother. Mrs. Brady, as a member of the Volunteer Associates since its organization in 1946 and chairman from 1951 until 1956, and also as a member of the Board of Managers of the Garden, has given unstintingly of her time and abundant energy. By means of her leadership, tours, theatre benefits and allied projects were organized, gifts have been stimulated, and many friends attracted to the Garden."

Dr. David Rogers read the citation to Dr. Fulling: in part—"Dr. Fulling's interest in forest trees has been evident in much of his published work . . . He is the author of a catalogue of and a guide to the Pinetum of The New York Botanical Garden. He has also written numerous popular articles on trees and shrubs and their products. He is widely traveled, and the breadth of his interests and his outlook is attested by his writings on Thomas Jefferson in relation to botany and on man-made law as it has been concerned with plants. He has also translated into English several botanical papers and an important book from other languages.

"Dr. Fulling's unique contribution to the science of plants has been as editor. In 1935 he founded THE BOTANICAL REVIEW and has published, managed, and edited it ever since . . . Not content with thus creating a distinct type of botanical serial, Dr. Fulling in 1947 began publication of ECONOMIC BOTANY, which joins the viewpoints and interests of the botanist with those of industry. The rights to the publication of this journal he has presented as a gift to the Garden."

Dr. Clark T. Rogerson read the citation presented to Mr. and Mrs. R. Gordon Wasson: in part . . . "[Mr. Wasson] has served The New York Botanical Garden on its Board of Managers and as its Treasurer.

"His talented wife, Dr. Valentina Pavlovna Wasson, was born in Russia, but took her medical degree in London where she and Mr. Wasson became acquainted. Several years later Mr. Wasson learned of his wife's great interest in mushrooms, and they began their study which has been an absorbing interest throughout their lives and has culminated in the publication of the two-volume work which they co-authored, MUSHROOMS RUSSIA AND HISTORY . . . An interesting outcome of the Wasson's investigation was the rediscovery of the rites of the divine mushroom in southern Mexico, where the natives eat them to induce hallucinations which they consider of religious significance and which are attributed to have curative powers.

"Mr. and Mrs. Wasson most generously have been dedicating the proceeds from the

Dr. William C. Steere

sale of their book to The New York Botanical Garden. The monies thus realized are being placed in a special fund known as the Wasson Fund to be used for ethnomycological research."

Miss Elizabeth C. Hall read the citation to Mrs. Thomas J. Watson: "To none is The New York Botanical Garden more deeply indebted than to Mrs. Thomas J. Watson. As a hostess par excellence she has furthered the work of the Garden by freely placing at the disposal of the Volunteer Associates the matchless facilities of her beautiful home. Her benefactions through the Advisory Council aided in no small measure in providing the very necessary equipment needed for the new Research Laboratory Building in which four laboratories were dedicated in her honor. Other projects have been stimulated because of her kindness, notably the very fine new planting on the terrace immediately in front of the main Conservatory."

Mr. Harding introduced Dr. William C. Steere the new Director of the Garden, who will assume his duties on July 15, 1958. Mr. Harding announced that Joseph R. Swan who had been President of The New York Botanical Garden from November 19, 1937 to May 26, 1949, and Chairman of the Board from May 1949 to May 1958, had requested that he not be renominated as Chairman of the Board in view of his advancing years. Mr. Swan will soon celebrate his eightieth birthday. The members of the Board of Managers whose term expired in 1958 were re-elected to succeed themselves; and to fill a vacancy on the Board, created by the death of Edwin De T. Bechtel, Dr. William C. Steere was nominated and elected.

"Morven," the first official residence maintained by the state of New Jersey in more than one hundred years and presently the home of Governor and Mrs. Meyner, was one of the historic homes and gardens visited on "May Day in Princeton," of the Garden Club of New Jersey. Literally thousands participated in the very successful event the proceeds of which will be applied to the military and veterans garden therapy program, scholarships and other civic projects of the Garden Club of New Jersey.

Dr. William C. Steere Takes Up His Duties as Director of The New York Botanical Garden, July 15, 1958. Dr. William C. Steere assumes his duties as Director of The New York Botanical Garden on July 15, 1958. Dr. Steere, who has been professor of biology at Stanford University, Stanford, California, since 1950 and also Dean of its Graduate Division since 1955, is widely known in this country and abroad for his investigations and writings on the bryophytes.

Bryophytes, in everyday language, are the mosses and the liverworts which the average individual hardly notices; but growing together, as they do, in small tufts and mats, these small, often tiny plants furnish much of the soft grey-green and mossy green color of moors and moist mountain forests, clothing not only the ground and rocky ledges but sometimes the trunks of the trees as well. Being able to endure extremely low temperatures and other unfavorable conditions, mosses are among the few plants that inhabit arctic regions. Peat, obtained from sphagnum moss bogs, serves as fuel for heating and cooking in the cold northern countries of Europe; and while not so used in North America, there is an enormous supply on this continent for an emergency. Peat is also a potential source of hydrocarbon.

During 1948-54 Dr. Steere spent considerable time in northern and arctic Canada, central and arctic Alaska, and on St. Lawrence Island as senior botanist of the Alaska Terrain and Permafrost Section of the U. S. Geological Survey, and as research investigator of the Arctic Research Laboratory at Point Barrow, investigating the ecology and geographical distribution of arctic bryophytes. He has also made a study of the chromosome number and behavior of arctic mosses; has studied the mosses and liverworts of Michigan, and has collected mosses in Puerto Rico, Yucatán, Guatemala, Chile, Colombia, and Ecuador; and has more than 130 publications to his credit.

His "Contribution to the Bryogeography of Ecuador" was based on extensive exploration and collection of bryophytes during the period he served as senior botanist of the U. S. Economic Warfare Cinchona Missions to Colombia and Ecuador. Dr. Steere found collecting mosses a relief from the tedious waiting for good weather to permit the search for quinine-producing trees. The cinchona trees that yield quinine grow on the wettest slopes of the Andes where the annual rainfall is at least 100 inches, some areas as much as 200 inches. There were many days when quinine-hunting was impossible because of bad weather, impassable trails, and swollen rivers.

Born fifty years ago in Muskegon, Michigan, he was educated at the Ann Arbor High School and the University of Michigan, from which he received his bachelor and master degrees and his doctorate. While a graduate student at the University of Pennsylvania, Dr. Steere taught biology at Temple University; then he joined the staff of the Department of Botany at the University of Michigan as instructor in 1931 and rose to professorship in 1946. He was also Chairman of the Department from 1947-1950, when he received his appointment to Stanford University.

In addition to his many contributions to scientific literature, Dr. Steere was editor, Michigan Academy of Science, Arts and Letters, 1936-40; associate editor of *Annales Bryologici,* 1938-42; editor-in-chief of The Bryologist, 1938-1954, and of the American Journal of Botany, 1953-57. He is currently serving as associate editor of The Bryologist.

Dr. Steere is a member of many scientific organizations including American Association for the Advancement of Science, Botanical Society of America, American Society of Plant Taxonomists, American Bryological Society, Torrey Botanical Club, American Society of Naturalists and its president in 1957, British Bryological Society and International Association for Plant Taxonomy; a corresponding member of *Instituto de Ciencias Naturales de Venezuela* and *Societas Zool.-Bot. Fennicae "Vanamo"* and an honorary member of *Instituto de Ciencias Naturales del Ecuador.*

In 1954-1955, Dr. Steere was program director for systematic biology, National Science Foundation and since then has been a member of the advisory panel to the Program; also in 1956 and 1957, Dr. Steere was a member of the advisory panel to the Program for Summer Science Institutes, National Science Foundation. He is chairman of the committee of the Botanical Society of America responsible for the preparation of the Society's fiftieth anniversary volume. This volume, entitled "Fifty Years of Botany," a symposium of forty papers, is being published in July 1958 by McGraw-Hill Book Company under Dr. Steere's editorship. Dr. Steere has another major work in press: "The Mosses of Puerto Rico" in collaboration with Dr. Howard A. Crum, Biologist of the National Museum of Canada at Ottawa, being published by the New York Academy of Sciences.

Water Colors of Flowers in Palestine by Mrs. Bertha Spafford Vester hung in the Museum Building during the month of April, 1958. These paintings were made by Mrs. Vester during her sojourn of sixty-five years in Palestine, first under the Turks then through two world wars under the British mandate, and now through the more recent turmoil. She was held in high regard by Field Marshal Lord Allenby, T. E. Lawrence and by Dr. John Findley, notable editor of The New York Times. Mr. Lowell

Thomas described her aptly as a "modern Florence Nightingale," in the foreword he wrote for her book, OUR JERUSALEM, published by Doubleday in 1951.

Note From the Library. Recently in the library of the United States Geological Survey in Washington, a book was found with John Torrey's name in it. It was volumes 1 and 2 (bound together) of the Annals of the New York Lyceum of Natural History of New York (now the New York Academy of Sciences). In volume 1, pages 283-373, is a classic "Monograph of the North American species of Carex." Torrey, with characteristic modesty, added to the title the name of Lewis von Schweinitz as author, with himself as "editor;" but it was largely his own work. In his own copy, mentioned above, he made a number of annotations and corrections in ink. Since Torrey became one of the early authorities in this difficult group of plants (and since he was in a way the godfather of The New York Botanical Garden), these notes are of considerable interest to us. The Geological Survey volume was borrowed and Torrey's annotations have been inserted in our own copy.—H.W.R.

Tea in Honor of Henry De La Montagne. Henry de la Montagne was honored at a tea given at The New York Botanical Garden, in the Snuff Mill Meeting Room, on June 5, 1958. Mr. de la Montagne, who will retire from the staff on September 1, 1958, has been associated with The New York Botanical Garden for fifty years. Since 1935 he has been Assistant Director, since 1937 Secretary of the Corporation of The New York Botanical Garden. A member of the Board of Managers since 1929, Mr. de la Montagne holds the record of the longest period of service of any board member.

Mrs. Hermann G. Place of New York City and Millbrook, N. Y., was hostess at the tea assisted by Mrs. Mildred Saffell, Mrs. Julian E. Kene, Mrs. Charles Thomas, Mrs. Mildred Davis, and Mrs. Dorothy E. Hansell.

Guests included the Board of Managers, the Advisory Council, the Volunteer Associates, staff, and other Garden employees.

Sixteenth Annual Rose Day. The Rose Garden, replanted according to a plan prepared by the late Miss Marian Coffin, Landscape Architect, at the suggestion of Henry F. du Pont, Chairman of the Horticultural Committee of The New York Botanical Garden, was the setting for the morning session of the Sixteenth Annual Rose Day on June 12, 1958. It was a perfect June day, and the Rose Garden was at its peak.

Rosarians, amateur and professional, visiting the Rose Garden between 9:45 - 11:45 a.m., found experts ready to answer their questions. The experts included Paul F. Frese, Garden Editor of House Beautiful, Dr. A. D. Mollin, member of the American Rose Society, T. A. Weston, Garden Editor of The American Home, Mrs. Dorothea Bobbink White, President of Bobbink & Atkins, Rutherford, N. J., Mrs. Edward O. Winegar, Director of District 2—New York of the American Rose Society, Mr. Politi, and Dr. P. P. Pirone, Plant Pathologist of The New York Botanical Garden. T. H. Everett, Horticulturist and Curator of Education, and Howard Swift, Assistant to the Horticulturist and Curator of Education of The New York Botanical Garden, were co-chairmen of the guest hosts. Mrs. Dorothy Ebel Hansell, Editor of THE GARDEN JOURNAL, was in charge of the arrangements for the day.

Dr. David D. Keck, Acting Director of the Garden, welcomed the visitors assembled in the Lecture Hall of the Museum Building for the afternoon session. Mrs. John E. Parsons, a member of the Garden's Advisory Council, who has devoted many hours to the replanting of the Ladies' Border and the Conservatory Court, discussed "Roses in the Garden Picture." Mrs. Esther Wheeler, long prominent as an exhibitor of and lecturer on artistic arrangements, and co-author with Mrs. Sam Lasker of THE COMPLETE BOOK OF FLOWERS AND PLANTS for INTERIOR DECORATION, demonstrated arranging roses. Mr. Everett conducted the always popular rose clinic in which the panel of experts participated.

Elizabeth Brigham Merriam Scholarship. The Garden Club of New Jersey has established the Elizabeth Brigham Merriam Scholarship in memory of Mrs. Francis L. Merriam, immediate past president of the club. The scholarship of three hundred dollars is renewable annually and is to be awarded to a student in the department of ornamental horticulture or landscape architecture at Rutgers University.

Garden Centers. The first garden center was opened in 1929 by the garden department of the Woman's Club of Hackensack, New Jersey. Ohio and Massachusetts soon adopted the idea, and in 1932 the National Council of State Garden Clubs, Inc., considered the subject at a conference in Iowa. Besides the many two-or three-day temporary garden centers held throughout the United States, there are now more than two hundred permanent garden centers. These centers are of service not only to an individual interested in horticulture, but to the community as a whole and are today recognized as a great civic force.

On the national level two awards, in memory of the late Mrs. Frederick T. Fischer, the originator of the idea of garden centers, are given annually and in several of the states state awards are made. In New Jersey the Elizabeth Hood Silver Trophy is awarded every year to the best garden center.

American Rhododendron Society held its annual meeting and show in the Meeting Room of the Snuff Mill at The New York Botanical Garden on May 24, 1958. Dr. David D. Keck, Acting Director, and Mrs. Keck, and Henry de la Montagne, Assistant Director, were guests at the luncheon. Dr. Keck accepted the blue ribbons awarded by the society to The New York Botanical Garden for its display at the previous year's meeting and exhibition, also held at the Snuff Mill, as well as its display this year.

A gold ribbon was presented to Nathaniel Hess, President of the New York Chapter of the American Rhododendron Society, for the best truss in the show. This was a truss of rhododendron 'Cynthia.'

On the day's program was a tour of the collections of rhododendrons, including the Dexter hybrids, and azaleas on the grounds of The New York Botanical Garden.

F. Kingdon-Ward, famous botanist, plant explorer and author, died on April 8, 1958, at the age of seventy-two. Mr. Kingdon-Ward was credited with introducing more than three hundred varieties of plants including rhododendrons, lilies, and the blue poppy *(Meconopsis Baileyi)* to European and American gardens from the Orient. He made extensive expeditions over a number of years to China, Tibet, Burma and India. These expeditions were financed by plant societies and individuals interested in ornamental horticulture. Many honors were conferred on Mr. Kingdon-Ward, including the Victoria Medal of Honor, the Veitch Memorial Medal of the Royal Horticultural Society, and the Livingston Medal of the Royal Scottish Geographical Society.

SPRING GARDEN TOUR (from page 130)

To the rear of the residence of "Florolyn," the estate of Mr. and Mrs. Edmund C. Lynch at Locust Valley, the long sloping lawn is bordered on one side by the guest cottage with its own formal garden, a cutting garden of hundreds of annuals, a vegetable garden whose stone wall is covered with rambling roses, and an orchard. On the other side is a rose garden, an azalea garden with a lily pond, an Italian garden, a swimming pool and pool house. All twenty-seven acres of "Florolyn" is under intensive cultivation.

Mrs. George Emlen Roosevelt was chairman of the Spring Garden Tour Committee, Mrs. Ethan A. Hitchcock Chairman of Hostesses; they were ably assisted by Mrs. James Cox Brady, Mrs. Henry P. Davison, Mrs. Walter B. Eaton, Mr. and Mrs. Umberto Innocenti, Mrs. Madison H. Lewis, Mr. and Mrs. Edmund C. Lynch, Mrs. Harold Ruckman Mixsell, Mr. Nathaniel Norris, Mr. and Mrs. Francis E. Powell, Mrs. Paul Pryibil, Mrs. Fergus Reid, Jr., Mrs. Herbert B. Wellington, Jr., and Mrs. John G. Winchester.

T H. Everett, Curator of Education and Horticulturist, Miss Elizabeth C. Hall, Librarian, Mrs. Dorothy E. Hansell, Editor of The Garden Journal, and Dr. P. P. Pirone, Plant Pathologist, participated in the tour as staff consultants.

BOOK REVIEWS (from page 144)

is a very complete coverage of the lesser-known bulbs including those planted in the spring, such as the anemone, begonia, canna, dahlia, gladiolus.

The English translation has been made by Dr. E. Van Der Ven-Ten Bensel and the line drawings, gorgeously completed by J. F. Van Der Broecke. Twenty-four plates of the usual outstanding Dutch color printing are included in this book, a valuable addition to every member's library.

F. R. TYROLER
Executive Secretary
National Tulip Society

THE TREE IDENTIFICATION BOOK. George W. D. Symonds. 272 pages, illustrated (photographs by Stephen D. Chelminski); indexed. M. Barrows & Co., New York. 1958. $10

This is essentially a book of tree photographs. The leaves, flowers, fruits, twigs and bark of our chief eastern trees are compared in separate groups under "Pictorial Keys," and then the very same snaps are brought together for each species under "Master Pages." In the latter is added a photo of the whole tree, usually in its winter bareness to display better the limb habit. The author had the assistance of E. J. Alexander, Associate Curator of The New York Botanical Garden, which speaks for the authenticity of his material.

With many of the advantages of photography, there are some intrinsic deficiencies. The bark photos show mainly the character of the furrows, and that not always easy to interpret exactly (perspective, depth,

Succulent Plants of New and Old World Deserts, by E. J. Alexander. 350 species treated, 100 illustrated. 50 cents.

Cacti and Succulents as House Plants, by E. J. Alexander. (Reprinted from Garden Journal.) 10 cents.

Plants of the Holy Scriptures, by Eleanor King, with a check-list of plants mentioned in the Bible, each one accompanied by a quotation. 25 cents.

Montgomery Conifer Collection, by Dorothy Ebel Hansell. Non-technical descriptions of plants in this collection at the Garden; also background information. Illustrated. 50 cents.

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THE NEW YORK BOTANICAL GARDEN

sharpness, etc.) because of angle of lighting and other technical difficulties. Who, regardless of how intimately acquainted with the trees, would dare in many cases to identify from the bark or habit photos? The bark color difference in the white and red oak sections is not apparent; the differences in color and fragrance in the gummy buds of certain poplar species cannot be shown. Details of pubescence are missed; e.g., the cilia are not clear on fruits of the American elm, nor the hairy pad on the upper margin of the leaf-scar of the butternut, or the axillary tufts of hairs in the leaves of the black oak. As in other pictorial representations, only individual plants are shown, little indicating the usual variations to be expected. Then it's woe to the novice who always finds it a black mystery to pick out the essentials and evaluate the variations!

Irrespective of difficulties mentioned, the book should serve the novice easily, adequately and pleasantly to identify the genera and often the species of trees, exactly as the author promised. The good quality of the numerous photos (thanks to S. D. Chelminski!) makes them valuable additions to the ever-richer growing portrait gallery of our eastern trees.

JOSEPH MONACHINO

PLANT CLASSIFICATION. Lyman Benson. 688 pages, illustrated (principal plant dissections and illustrations by Jerome D. Laudermilk); indexed. D. C. Heath & Co., Boston, Mass. 1957. $9

This is the first of two works planned by the author on the subject of plant classification; a more advanced text, dealing with some of the fine points of nomenclature, the preparation of floras and revisions, and with some of the basic philosophy involved, is to be published subsequently.

This volume is designed for the person not only without botanical background, but without biological training of any sort. This fact must be kept in mind when using the book, for many, rather distantly related topics are considered for the benefit of the student lacking such training. It may be argued that, since Botany I is a prerequisite to a taxonomy course in most colleges and universities, some of the details could have been spared. It is not the sort of textbook which requires a great deal of amplification and clarification by the instructor. In fact, some professional taxonomists may even object to its rather semi-technical style, but, if this manner of writing can catch and stimulate the interest of students, botanical taxonomy may gain at least respect, if not converts. Besides the attractive style of writing, there are literally scores of good drawings and photographs which will attract the interest of beginning students.

The scope of the book is considerably greater than in most such texts, for not only flowering plants but gymnosperms and pteridophytes are treated, from a taxonomic standpoint. The section dealing with each of these major groups begins with a rather complete review of the morphology and the vocabulary for describing it. Then follow keys to the principal subdivisions of the group, including keys to the families within each order. The descriptions and discussions of each of the families are rather generalized but, generally adequate for the purpose of the book. Certainly, the very frequent references to plants in the West and the Southwest will convince some reviewers that is is too localized in its appeal, although there is a very obvious attempt to avoid this criticism.

The subsequent chapters deal with the collection and preservation of plant specimens, the bases for classification, and the various historical and modern systems of classification (including a realignment of families proposed by the author). The final section takes up the general principles underlying the classification of vegetation, and the vegetational units of North America are characterized in words and by many excellent illustrations. The book is concluded with an appendix, a glossary of technical terms, and a remarkably complex index. (The most unusual feature, and one which is likely to rankle the professional, is the author's validation of several new groups by Latin descriptions in the appendix. This is certainly contrary to the spirit of the International Rules of Botanical Nomenclature, which recommend against publishing new taxa in "ephemeral publications" and surely most textbooks are short-lived!)

Taking everything into consideration, it is a very good text and recommended for the purpose set forth by the author; it does have the limitation of being designed only for an introductory course, and a second text and second course would be required to prepare adequately the prospective taxonomist.

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FLOWERING TREES OF INDIA. M. S. Randhawa. 210 pages, small quarto; 36 color plates of tree and flower paintings. Indian Council of Agricultural Research, New Delhi. 1957. $7.50

Dr. Randhawa mixes poetry and art in his scientific studies; he has wandered all over the face of India to feast his eyes on the beauty of the flowering trees for which that country is world famed. When his newly awakened country adopted a national policy of tree planting to replace the denuded forests, and to line canals, roadsides and villages with trees, the author came forward to write the saga of the Tree Beautiful. His countrymen have neglected tree planting in the past, and particularly they have ignored the wealth of beautiful flowering ornamentals. Trying to stimulate them to capitalize this beauty in the new planting program, Dr. Randhawa reviews the place of tree flowers in Indian music, art, and literature, and then he launches into extensive plans for beautifying his own garden, his neighbors' gardens, their city, their state, their whole nation. His enthusiasm is contagious, and as he really knows his trees and which ones are best suited for different locations, climate, and other conditions, he sparks a move to make India the really beautiful country nature intended it to be.

Only twenty pages are devoted to a select list of Indian trees to carry out the program, but their characteristics, the best ways to propagate each, and other cultural information is well covered. Other parts of the world need torch bearers like Dr. Randhawa to stimulate greater beauty in landscapes.

EDWIN A. MENNINGER
Stuart, Florida

THE CHEMISTRY OF PLANTS. Erston V. Miller. 174 pages, indexed. Reinhold Publishing Corp., New York. 1957. $4.75

One of the difficulties inherent in writing a good book on the chemistry of plants is that of tailoring it to the needs of readers of widely different backgrounds. This volume is a sort of compromise—partly because of the nature of the subject matter, and partly because of the brevity of the coverage. It will give the biologist some notion of the chemical relationships and structural complexities of plant products, and will help the chemist acquire some feeling for the type of compounds generally to be expected in plants. It does no more than this.

THE CHEMISTRY OF PLANTS serves as a useful outline for the biologist and the chemist, providing preliminary orientation in the field. Its usefulness as a reference book, however, is impaired by several errors and misleading statements, e.g., in connection with the glycoside phloridzin, "It consists of glucose and phloretin, the latter containing a phloroglucinol nucleus and benzyl alcohol." There is no benzyl alcohol moiety in phloretin. On nomenclature: "The prefix D or L is used on organic compounds to indicate that they are dextro-or levoratatory, respectively. Sugars, however, constitute an exception to this rule because the D- and L- in this case merely indicate a structural relationship to D- and L- glycerin aldehyde." Generally accepted prefixes, to indicate optical rotation, would be small d and l. Small capitals D and L indicate structural relationships, not only in the sugars, but also in the amino acids. Another definition, "Uronic acid is the general term applied to a hexose which has been oxidized without being dismembered." This definition includes the aldonic acids (sugars in which the aldehyde group has been oxidized). This is incorrect. The uronic acids are sugar acids having an intact aldehyde group, but a carboxyl group instead of the end alcohol grouping.

On the other hand, the book gives a clear cut outline of events in glycolysis and in the citric acid cycle, and a convenient classification of the most abundant plant products as well as of alkaloids and plant pigments. It has the virtue of not obstructing the forest by the trees.

The subject matter is organized on the basis of the chemistry of the compounds discussed, e.g., there are separate chapters on carbohydrates, proteins, lipids, etc., although this arrangement is not rigid. A valuable addition would be a chapter in which the subject matter was classified from the point of view of plant structure and/or function, i.e., chemistry of the stem, the leaves, the flowers, the seed, etc. This might include characteristic species differences

where they have been reported.

A book like THE CHEMISTRY OF PLANTS is needed, and this volume will serve a useful purpose, particularly if in a future edition the shortcomings mentioned are remedied.

MARJORIE ANCHEL

HOW PLANTS GROW (from page 141)

action light or perhaps length of darkness triggers some mechanism which shifts the entire pattern of plant growth from vegetative to fruiting. It is possible to prevent, for example, a long-day plant from flowering by holding the plant under short days for an indefinite period. Little is known concerning the mechanism involved, although recent evidence indicates auxin may be involved in the control of flowering.

Light has effects on plants other than flowering response. Kinzel studied the germination of seeds of nearly one thousand different plant species. In this work light was favorable to seventy per cent, inhibitory to twenty-five per cent, and neutral to five per cent of the species studied.

Leaf size and shape, stem thickness, and internode length are factors which may be controlled by light. The idea has prevailed that "summer growth" was associated with increased temperature. Dr. Samuel Johnson has recently grown typical summer type cotton plants in the greenhouse during the winter, when the temperature did not rise above 80° F. In this experiment the normal day light was supplemented with infrared radiation.

Plants are known to respond to a daily temperature cycle. Night temperature is important in the fruiting of tomato plants. Increase yields were obtained when plants were grown in warm days and cool nights.

How do plants grow? We are just beginning to understand a few of the mechanisms involved. This process is infinitely more complex than finding the answer to the structure of atoms, in fact, the answer to this question is the answer to life.

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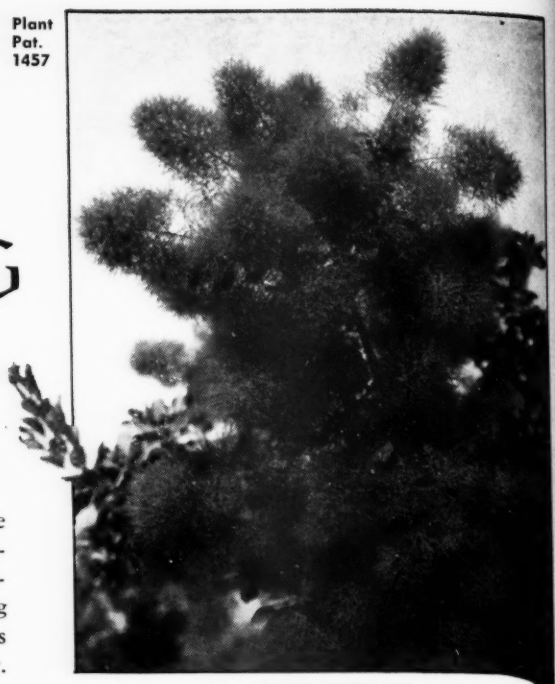

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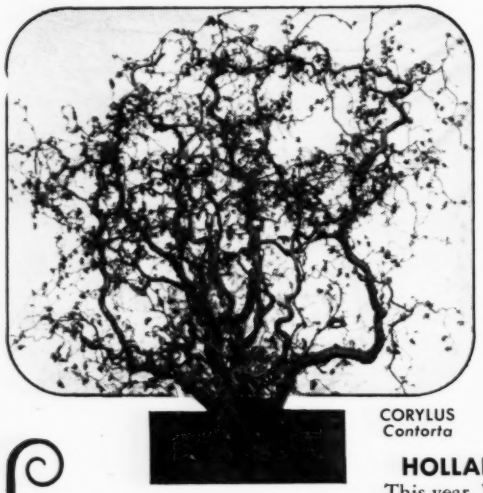

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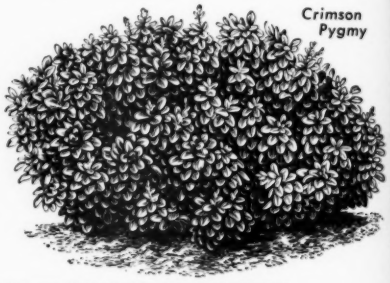

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